



The Report of The Joint Federal-Provincial Inquiry Commission into Safety in Mines and Mining Plants in Ontario

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Volume 1

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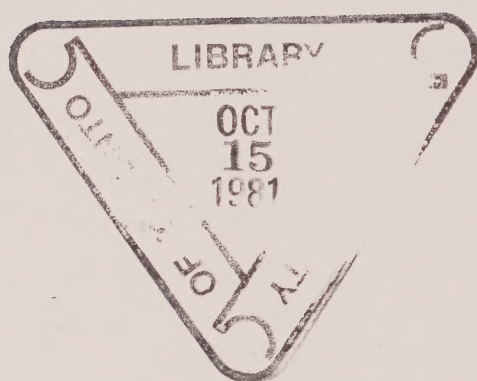
Towards

Safe

Production

Volume 1

The Report of The Joint Federal-Provincial
Inquiry Commission into Safety in Mines
and Mining Plants in Ontario





Joint Federal - Provincial Inquiry
Commission into Safety in Mines
and Mining Plants in Ontario

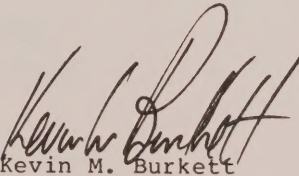
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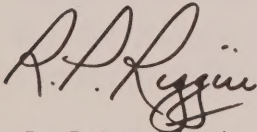
Hon. Gerald A. Regan, P.C.
Minister of Labour,
Canada.

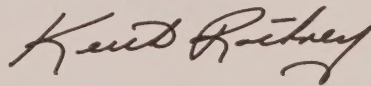
Hon. Robert G. Elgie, M.D.
Minister of Labour,
Ontario.

Dear Sirs,

We were appointed in July, 1980 as a Commission to inquire into and report to you on the adequacy of existing arrangements and practices that may affect the safety in mines and mining plants in the Province of Ontario. Having completed our inquiries, we submit herewith our report.


Kevin M. Burkett
Chairman


R. Peter Riggan


Keith E. Rothney

April, 1981

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Preface

The Minister of Labour of the Province of Ontario, on July 8, 1980, appointed us an Industrial Inquiry Commission to inquire into and report to him,

‘on the adequacy of existing arrangements and practices that may affect safety in mines and mining plants in the Province of Ontario and to make such recommendations in relation thereto as may be appropriate.

Since uranium mining falls under federal jurisdiction, the Minister of Labour of Canada, on July 9, 1980, appointed us a Commission of Inquiry with a similar mandate to report to him respecting safety in uranium mining and uranium mining plants.

Pursuant to these appointments, we conducted our inquiries as a Joint Federal–Provincial Inquiry Commission. In like fashion, this Report contains our findings and recommendations regarding both our mandates.

The Commission was appointed in response to an alarming number of worker fatalities in Ontario mines and mining plants in the first half of 1980. Eighteen such fatalities had occurred as of the date of our appointment. This number of fatalities gave rise to a deep-seated concern because of the recent efforts of the industry, government and unions to improve worker safety in Ontario mines and mining plants. An exhaustive inquiry into safety and health in the industry was completed by Dr. James Ham in 1976. The recommendations contained in his report form the basis of much of the statutory and administrative framework for worker safety today. Following release of the Ham Report, a number of administrative and legislative initiatives were undertaken in respect of worker safety. *Inter alia*, the right of workers to refuse unsafe work, the requirement for modular training in the industry, and the formalization of joint health and safety committees became part of the legislative framework.

The effect of the legislative and administrative changes combined with the efforts of those in the industry resulted in a favourable experience in the immediate post-Ham period. Compensable injury rates in Ontario mining fell from 71.9 to 43.2 per million man hours worked over the period 1976-79. Fatalities, which had risen to 22 in 1976, fell to 9 in 1979. However, in the first half of 1980, there was a dramatic turnabout. By July 1980, the lost-time injury rate had climbed to 65.0 per million man hours worked and the fatality rate was four times the projected rate based on recent experience. It is against this background that the Commission was appointed to inquire into the adequacy of safety practices and arrangements in Ontario mines and mining plants.

In an attempt to gain an understanding of the safety practices and arrangements in place, to allow for full participation, and to come to reasoned conclusions with respect to the adequacy of these practices and arrangements, the Commission undertook a multi-faceted inquiry.

- We visited a number of mines and mining plants in order to acquire a first hand understanding of the work processes and the conditions of work. The Commission had the opportunity to view miners at work in both large stope mechanized mines and in small vein mines and to talk freely with workers, supervisors and union representatives.
- We conducted public hearings in Sudbury, Elliot Lake, Timmins, Thunder Bay and Toronto. In an attempt to focus these hearings, the Commission prepared an issue document which was widely circulated in advance of the hearings. This document is reproduced as Appendix I to Volume I of our Report. In an effort to keep the hearings as informal as possible and to encourage the free flow of dialogue, the Commission neither retained legal counsel nor transcribed its proceedings. Submissions were received from workers,

companies, unions, governments, the Ontario Mining Association and the Mines Accident Prevention Association of Ontario. A list of the briefs presented to the Commission is attached as Appendix 2 to Volume I of our Report.

- We commissioned an update of the statistical data contained in the Ham Report in order to assess trends, to identify factors relevant to our inquiry and to make the Commission better able to evaluate the oral and written submissions. The statistical data thus obtained has been used throughout our Report. The statistical update is reproduced in Volume II of our Report.
- We contracted for research papers on a number of selected topics. These include the relationship between worker attitude and safety; the relationship between alcohol, drugs and safety; ground control; the adequacy of the data base; and the ‘margin of safety’ concept in place at Texasgulf Canada Limited. We also obtained a comprehensive legal opinion with respect to the jurisdictional and administrative arrangements for the safety of uranium miners. These papers contributed greatly to our understanding of several of the complex issues before us and support a number of our conclusions. These papers are reproduced in Volume II of our Report. We also engaged in informal discussion with a number of academics on matters pertaining to our inquiry.
- We conducted interviews with officials of government, safety associations and companies operating in Ontario with superior safety performance. We were struck with the consistently superior safety performance of two companies within the Ontario mining industry (Texasgulf and Campbell Red Lake). We identified a number of superior performing companies outside

the mining industry and undertook to determine if common management practices, philosophies or organizational arrangements could be identified as contributing to this superior safety performance. Our findings in this regard provide support for several of the recommendations set out in this Report pertaining to direct and contributive responsibility for worker safety. Graphs depicting the accident frequencies of these superior performing companies (Texasgulf, Campbell Red Lake, Dupont, Union Carbide and Eastern Construction) relative to their respective industry averages are set out in Appendix 3 to Volume 1 of our Report.

- We conducted informal workshops with randomly selected supervisors from five large mining companies (Rio Algom Limited, Denison Mines Limited, Falconbridge Limited, INCO Metals Limited and Texasgulf Canada Limited). These workshops allowed the Commission to clarify further a number of issues; especially as these issues relate to the important function of the first line supervisor. The work of the Commission benefited greatly from the frank and incisive comments of these supervisors.
- We made contact with the mines inspectorate in other provinces, the U.S. Bureau of Mines, the British Coal Board, and Swedish labour officials through their respective consulates.
- We reviewed the current literature dealing with occupational safety and the operation of effective safety systems.

The safety performance of the Ontario mining industry in the decade of the 1970s compared favourably with that of other jurisdictions. Relevant tables are reproduced as Appendix 4 to

Volume I of our Report. There is no way of knowing, at this early date, whether its performance in 1980 is a short-term anomaly or the start of a longer-term negative trend.

In any event, the performance of the industry relative to other jurisdictions is but a single broad indicator of safety performance. Our mandate is not to determine whether the safety performance of the Ontario mining industry compares favourably with that of other jurisdictions. The primary focus of our inquiry has been to determine how the Ontario mining industry can improve its safety performance. The fact that two companies consistently outperform all of the others suggests that the practices and arrangements in place at many of the other companies may be lacking in some respects.

We have made a comprehensive inquiry into all existing safety practices and arrangements in the industry, including those recommended by Dr. Ham and embodied in the current legislation. Volume I of our Report is divided into three sections: the first deals with direct responsibility; the second deals with contributive responsibility; and the third deals with the separately identifiable issues raised before us. We have found existing safety practices and arrangements to be deficient in several respects. Accordingly, we have made a number of recommendations designed to bring about improvements. A list of these recommendations is reproduced as Appendix 5 to Volume I of our Report. Many of these recommendations relate to the need for improved relationships and attitudes. We are firmly convinced that the quality of the human element is determinative of the ultimate effectiveness of any safety system.

The companies within the Ontario mining industry co-operated with the Commission at every turn. The positive attitude exhibited by these companies bodes well for the future. Likewise, the unions representing miners and mining plant workers

co-operated and participated fully in the inquiry. The Executive Director of the Mines Accident Prevention Association and the Director of the Mining Health and Safety Branch willingly extended themselves on our behalf. We are grateful for the effort, co-operation and participation of all concerned.

The Commission wishes to acknowledge the important contribution made by its staff. The efforts of Mr. Cam Barrett B.A.Sc. Mechanical Engineering, as a special consultant and Ms. Ailsa Wiggins B.A., LL.B., LL.M., as a legal assistant are acknowledged. Mr. Ron Smith, B.A., M.B.A., who served as the Commission's executive secretary, arranged our itinerary and took an active part in the public hearings and all of our other endeavors. He proved himself to be a competent and energetic executive secretary and we are indebted to him.

Introduction

The concepts of direct and contributive responsibility underly the present legislative framework for occupational health and safety in the province of Ontario. These concepts were not challenged before us and in our view are essential to any effective safety system. However, it is our observation that these concepts are not clearly understood within the Ontario mining industry. In many instances, both companies and workers have failed to appreciate and act upon the vital distinction between direct and contributive responsibility. In addition, many companies have failed to recognize the value of meaningful consultation as a contributive factor which will assist the quality of its decision-making and improve worker attitude.

To facilitate our inquiry, the Commission found it useful to draw a clear distinction between the organizational units and functions associated with direct responsibility and those associated with contributive responsibility. Direct responsibility for safe production extends to those who are directly responsible for the organization of work, the design of work practices and the manner in which, and the conditions under which, work is performed. Direct responsibility falls to worker, supervisor, management and executive; the line organization. Contributive responsibility extends to those who, although not directly responsible for the performance of work, are in a position to contribute to safe production through consultation, advice, audit, inspection, etc. Contributive responsibility falls to health and safety committees, safety departments, unions, the Mines Accident Prevention Association of Ontario and the Mining Health and Safety Branch.

The Ham Report¹ provides the foundation for the essential distinction which has been drawn. Initially, our support for the

¹ On September 10, 1974, Dr. James M. Ham was appointed a Royal Commissioner to investigate and report on the Health and Safety of Workers in Ontario Mines. He conducted an exhaustive inquiry into all matters related to the health and safety of workers in mines and transmitted his report to the government on June 30, 1976.¹

approaches recommended in the Ham Report rested on intuitive grounds and upon the rationale expounded by Dr. Ham. However, having inquired into and examined the adequacy of current safety practices and arrangements in the Ontario mining industry, we are fully supportive of the approaches described in the Ham Report. The concepts of direct responsibility and contributive responsibility, when incorporated into a system for safe production, combine the critical elements of accountability and involvement. We are convinced that safety practices and arrangements which do not rest on these elements cannot adequately provide for the safety of workers. It is imperative that all those with a responsibility for the health and safety of workers in the Ontario mining industry understand the meaning of direct responsibility and the distinction between direct and contributive responsibility, and demonstrate a preparedness to undertake their respective roles in a committed, constructive and cooperative manner. We have found in our inquiries that:

- Several companies have failed to establish the central line of authority as the core of the accident prevention system. This failure manifests itself in a lack of clearly defined goals and objectives, a lack of accountability at all levels of line management and a propensity to buttress support functions (i.e. safety departments) in response to rising accident frequencies rather than alter the way in which work is performed, supervised, managed and rewarded.
- Several companies have failed to recognize the value of meaningful consultation both as a vehicle for input into decision-making and as a mechanism to improve worker attitude.

- Several local unions are content to allow the mechanism for consultation which has been established in law to be used to debate individual worker safety complaints and as a forum to deal with matters which are only peripherally safety related, rather than as a means to facilitate worker contribution to safety policy and programs.
- Many workers, with apparent approval of local unions, are bypassing first line supervision (the worker's contact within the direct internal responsibility system) and attempting to use the mechanisms for consultation in a manner which was never intended.
- Several local unions are critical of the consultation which goes on between company safety staff and first line supervision and seek to have safety staff vested with overriding authority, thereby belying a lack of understanding of the concept of direct responsibility for worker safety.
- Worker attitude, as manifested in unsafe work practices, is all too often viewed as the primary cause of rising accident frequencies without recognition of the responsive nature of worker attitude and the direct responsibility of management to use the resources and authority at its disposal to create a working environment within which workers will respond positively.
- Several local unions have failed in their contributive responsibilities by not recognizing the extent of their influence over the individual worker and by concentrating on the identification of workplace hazards at the expense of eliminating unsafe work practices.

The absence of a common understanding with respect to the meaning and application of direct responsibility and contributive responsibility has resulted in role confusion, misplaced expectations and, inevitably, to an unhealthy level of frustration within the system. Perhaps the structure of the *Occupational Health and Safety Act, 1978*, which deals with consultative mechanisms before specifying the duties and responsibilities of the direct participants, has contributed to the misunderstanding.

The first section of our Report deals with direct responsibility.

Direct responsibility for the performance of work extends from the chief executive officer through management to the first line supervisor and the worker. It is imperative that this line be recognized as the critical line in accident prevention. The chief executive officer has ultimate authority over, and responsibility for, the functioning of the line organization. Hence, we view the chief executive officer as the single most important participant in a company's safety system. It is the chief executive officer who must make the commitment to safe production and ensure that the depth of the commitment is understood throughout the organization. He must formulate objectives, allocate resources and assign responsibilities within the organization to facilitate the attainment of these objectives, monitor performance and maintain accountability. We will discuss the chief executive officer's responsibilities within the direct responsibility system.

The first line supervisor is the second most important participant in a company's safety system. The first line supervisor interacts with the worker and is responsible for maintaining standards relating to the conditions under which, and the manner in which, work is performed. We will discuss the role of the first line supervisor and make recommendations with respect to the training and utilization of first line supervisors.

The worker is also a participant with direct responsibility for safe production. The worker's responsibilities have been separately set out in Sections 17(1) & 17(2) of *the Occupational Health and Safety Act, 1978*. Even so, the Commission has observed that not all workers clearly understand the scope and importance of these responsibilities. We will discuss the role and responsibility of the worker.

The second section of our Report deals with contributive responsibility and addresses the appropriate roles for those organizations and functions which support the direct responsibility system.

The Ham Report leaves no doubt that the centre of authority with respect to all matters relating to the performance of work rests within the direct internal responsibility system comprised of worker, supervisor, management, and executive. Health and safety committees, safety departments, local unions etc., are not seen as assuming decision-making authority with respect to the performance of work. Rather, they are viewed as a means of improving the quality and sensitivity of the decisions emanating from within the direct responsibility system. Although strongly recommending worker participation and supporting the concept of contributive responsibility, the Ham Report recognizes the 'prerogative of managerial responsibility' and emphasizes that:

'This same base of managerial authority would exist in any form of revised industrial democracy involving worker participation in management. The focus of ultimate accountability has been well stated by the United Steelworkers of America as follows: "The employer must accept the full legal and moral responsibility to provide a safe and healthy workplace, protective equipment, safety and health training and safe work procedures."' '

We accept and endorse these views. If the direct responsibility system is to be effective, the prerogative of managerial responsibility must be recognized by workers and their representatives. Indeed it is incumbent upon workers and their representatives to ensure that management meets its responsibilities with respect to the manner in which, and the conditions under which, work is performed. However, management must recognize that its prerogative in this area carries with it the requirement to consult in a meaningful way with those who, at one and the same time, have the capability of contributing to managerial decision-making and are directly affected by it. It is in this context that we address contributive responsibility.

The contributive effort of joint health and safety committees is essential to the performance of the direct responsibility system. The health and safety committee structure was envisaged by Dr. Ham as a means of providing for worker input into substantive matters relating to health and safety and as a means of allowing those with direct authority over the performance of work to benefit from the views and perspectives of workers. In addition, the importance of the health and safety committee as a mechanism for removing health and safety matters from the adversarial climate which may exist in day-to-day union-management relations cannot be over-estimated. However, from our observations, these committees are not functioning as they should be.

The health and safety committee is described in the Ham Report as playing a 'consultative and advisory role' and as being: ' . . . a forum of consultation between those with the ability to contribute and those accountable for deciding what is to be done' Dr. Ham also astutely observes that:

'Someone accountable for making a decision does not impair his decision-making role by consulting those who can

contribute to it. Such consultation is indeed very likely to improve both the quality and acceptability of the decision.'

At a time of heightened worker expectation, we are distressed to find that in many of the organizations experiencing fatalities and/or unacceptably high accident frequencies, the quality of the consultation between workers, workers' representatives and management is seriously deficient.

We will be making recommendations with respect to the status of health and safety committees within an organization, joint training of health and safety committee members and supervisors, the insulation of the committee process from the other aspects of the union-management interface, and the proper tasking of health and safety committees. We will also make recommendations with respect to the manner in which individual employee concerns should be identified and responded to in a mining environment so that the health and safety committee is better able to perform its proper role.

Most Ontario mining companies maintain a department or function, usually staffed by safety specialists or professionals, which is given some responsibility for ensuring a safe working environment and compliance with work standards. In smaller mining companies this function is not usually organized into a full-fledged safety department. It is the function which requires definition and understanding whether or not housed in a formal department. If properly defined and understood, the role of the safety department is an essential one. We believe that the proper role of a safety department is not understood within certain companies or by workers and their representatives generally. A safety department operates outside the line of authority directly responsible for the performance of work and, therefore, it is not part of, but supportive of, the direct responsibility system. We see the safety department as playing an advisory and auditing role, and facilitating the integration

of the direct and contributive responsibility systems within an organization. We will be making a number of recommendations in this regard.

The union, as the agent of the worker, also has a significant contributive role to play in the process of consultation and in the shaping of worker attitude. The union has a measure of influence over individual workers such that it can either reinforce or undermine management communication and initiative in the field of health and safety. However, the influence enjoyed by the union over individual workers carries with it the responsibility to assess managerial initiatives honestly and to respond constructively where such a response is warranted. We will speak to the role and responsibility of both the local union and its parent body in matters of health and safety. As noted, the quality of the critical relationships are being adversely affected by the existence of an adversarial mentality. Over 90 per cent of production and maintenance workers in Ontario mines and mining plants are unionized and, therefore, relate to their employer through a bargaining agent and have their terms and conditions of employment determined through collective bargaining. Collective bargaining is designed to facilitate an accommodation of the competing interests of employers and employees by resort to economic sanction if necessary. The process is designed to allow the parties to function as adversaries in pursuit of self-interest and hence, the bargaining relationship may be characterized by periodic conflict and erosion of mutual trust from time to time. The value of free collective bargaining in a free society is not disputed by the members of this Commission. However, any carry-over of the adversarial approach into the day-to-day attention to health and safety matters is an undesirable side effect of free collective bargaining. Worker safety should properly be an integrative, as distinct from an adversarial, issue and, hence, the challenge for the parties is to develop the capability of dealing with health and safety issues in a consultative and co-operative manner. If the parties are unable

to develop this capability, the effectiveness of the safety system will be undermined. It is our observation that in many organizations an adversarial mentality is impeding the effectiveness of the safety system. We will speak of the need for the participants to rise above the adversarial approach in their day-to-day dealings with health and safety matters and will present a number of recommendations designed to assist the parties in this regard.

Both the Mines Accident Prevention Association of Ontario and the Mining Health and Safety Branch of the ministry have key contributive roles to play. We will discuss these roles and make recommendations designed to improve their respective contributions.

The third section of our Report addresses a number of separately identifiable issues that were raised before the Commission. We have not considered these issues in isolation, but, rather, have evaluated them in the context of the concepts of direct and contributive responsibility. Accordingly, in addressing the individual issues, we make recommendations which will test the commitment of those who are either directly or contributively responsible for the safety of workers.

Any system designed to minimize the risk of work-related accidents depends on the quality of the relationships between those who act within the system: worker, supervisor, management, union and government. While certain engineering and design standards must be maintained, in the final analysis, effective safety systems are more people-oriented than mechanically oriented. A recognition of the human element as the critical variable has broad implications for labour, management and government. The importance of the human element in safe production is a theme running throughout this Report.

Direct Responsibility

The Chief Executive Officer

The same legislative requirements are placed on all mining companies. Nevertheless, a review of accident frequency statistics reveals that some operations have consistently superior safety performances. Within the Ontario mining industry, the performance of both Texasgulf and Campbell Red Lake fall within the consistently superior category. We have attempted to identify the factors which have brought about this level of performance. We have done so by reviewing the written materials and by closely scrutinizing the management style, organizational structures and external influences which prevail, not only within these mining companies, but within some superior performing companies in both the construction and industrial sectors.

We have found that a strong management commitment to safe production, that is, an organizational requirement that defined safety standards be met, is the dominant common characteristic exhibited by the companies which demonstrate superior performances. We have discovered further, that it is the chief executive officer who sets the tone and ensures that safety is given the priority which it deserves. He establishes the policy, defines the responsibilities and allocates the resources necessary to bring about a safe working environment. Implementation of the safety program, depending on the size of the operation, may be the responsibility of various levels of management but it is the chief executive officer who provides the support and authority.

The Ham Report concluded that 'no position is more important to safe production than that of the first line supervisor.' Although we recognize the vital importance of the first line supervisor, it is our firm belief that the chief executive officer is the most important participant with direct responsibility for safe production. We believe that his commitment to safe production will be determinative of the safety performance of the organization for which he is responsible.

It is common practice within industry generally, and within the mining industry in particular, for the chief executive officer to issue a policy statement confirming the organization's commitment to safety and the obligation upon workers, supervisors and management to contribute to a safe working environment. The issuance of such a statement, while laudatory and necessary, should not be looked upon as fulfilling the safety responsibilities of the chief executive officer. The policy statement is but a first step. We are distressed to report that we have not been satisfied that the chief executive officers of a number of Ontario mining companies have recognized the extent of their influence or the scope and depth of their responsibilities in health and safety matters. The chief executive officer must become involved in the setting of goals, the assigning of responsibility, the allocating of resources and the buttressing of the necessary support mechanisms (health and safety committees, staff safety department, engineering functions) if his policy pronouncements regarding safety are to be reflected in the everyday running of the enterprise. It is this type of involvement by the chief executive officer and his senior officials which typifies the companies demonstrating superior safety performance.

We now turn to a consideration of the specific responsibilities which must be undertaken by the chief executive officer if he is to play the leadership role which is so critical in facilitating his organization's efforts at accident prevention. We acknowledge that the risk of accident is an inherent part of the production process. The primary responsibility of the chief executive officer is to take whatever steps are practical and feasible to minimize these risks. It was suggested to us, and we accept, that tradeoffs between production levels and safety performance are made by management within the Ontario mining industry. Where the very decision to produce carries with it the risk of accident, and where the resources available to the organization are finite, it is inevitable that some degree of trade-off will exist. The difficulty occurs where production goals are not set

in conjunction with safety objectives. It is imperative that the correlation between production levels and safety performance within the resource parameters of the organization be understood and acted upon. Given the resources available to the organization with which to screen, select, hire and train workers and supervisors, purchase and maintain equipment and machinery and improve technology, the chief executive officer, through his senior management, must bring production and safety into a state of acceptable equilibrium.

It is to be noted that the senior management of the superior performing companies do not consider industrial accidents to be inevitable, as some Ontario mining companies appear to do. These companies harmonize production and safety goals by taking all the steps which are seen as necessary to eliminate industrial accidents. It is only when production goals and safety objectives are considered in tandem by senior management and resource allocation decisions are geared to support safe production, that effective safety management can be put in place.

The rationale in support of assigning this responsibility to senior management and, more specifically, to the chief executive officer, is threefold. Firstly, the chief executive officer is responsible for the company's performance to its shareholders, workers, government and the public. The chief executive officer is best positioned to understand the social, moral, legal and financial implications of the decisions which must be made. It should be noted that the successful performers, without exception, support their unequivocal commitment to safe production on the basis of social, moral and financial grounds. The legal requirements are viewed as bare minimums. Secondly, having recognized the correlation between safety and production and having allocated sufficient resources (whether to hire additional workers or supervisors, train workers or supervisors, purchase or maintain equipment or adopt improved technology) to provide for the achievement of both safety and

production goals, the chief executive officer can hold his line management accountable for satisfactory performance. Thirdly, where senior management brings safety and production into an acceptable state of equilibrium, middle management and first line supervision are spared from having to reconcile what may be competing objectives.

If middle management or line supervision is required to meet production targets which have not been developed in concert with safety goals, they may be required to make trade-offs which they are not equipped to make. Inevitably, the company's ostensible commitment to safety will be undermined in the eyes of its workers and decisions will be made which may subject individual workers to unacceptable risks.

In its submission to us, Texasgulf described the 'margin of safety' which governs its corporate decision-making. The concept is described by Texasgulf in the following terms:

'At Texasgulf we believe that much of our success in accident prevention is attributable to the margin of safety available in our operations. We define this margin of safety as the amount of extra capacity available to make up or prevent a production loss caused by a major unforeseen outage. Broadly interpreted, the loss might be a large unit of equipment out of service, questionable local rock conditions, high absenteeism, a shortage of adequately trained labour and so on. It is a reserve that the manager, superintendent, shift boss and even the worker can call on to meet his assigned tasks without taking risks to catch up. The margin of safety might take the form of money, extra equipment, manpower or even acceptance of product shortfalls without censure from a supportive higher management.

'In our view the margin of safety is influenced by any level of management that controls the expenditure of money

and manpower levels on the one hand or sets production norms and judges the performance of the operation on the other hand. Once these variables are defined then that level of management or supervision cannot simply delegate the responsibility for safety to someone else farther down the line. At one end of the spectrum the shift boss who expects certain work to be done by the crew must assure they have an acceptable margin of safety to achieve the task or to make up a shortfall later without restoring to short cuts. At the other end of the spectrum the chief executive or other company officer who sets the money, equipment or manpower limits provided to realize production quotas has also influenced the margin of safety and cannot now logically delegate the complete responsibility for safety down the line. Others between these two extremes must also bear their share of responsibility depending on their degree of control over the key variables.'

The 'margin of safety' concept exemplifies the types of resource allocation considerations which must be made if senior management is to reconcile safety and production objectives.² The decision not to cross-shift mining crews at the Campbell Red Lake mine is an example of a margin of safety approach.

A key relationship which affects the margin of safety in a mining operation is the production capacity of the mine relative to the capacity of the mill. Given the capital intensive mill investment, production quotas of the mine must be determined by the ore-feed requirement of the mill. Mill shutdowns are extremely costly so that, in the absence of a margin of safety, pressure is exerted on mine personnel to provide the requisite

² In order to understand the concept better and to evaluate its applicability to other mining operations, we retained Basil Kalymon, Professor of Finance, University of Toronto School of Business, to analyze the concept and its economic implications for the industry generally. Professor Kalymon is the director of the school's Natural Resources Management Program. He has published the recent text *Canadian Resources Management: Concepts and Cases*.

production. Professor Kalymon lists the eight pre-milling processing steps in exhibit 2.1 of his paper and shows the type of inventory margin which may be built up at each step. He points out that inventories alone, in the absence of extra production capacity in the mine, would not be effective. Extra production capacity is required to maintain inventories on an ongoing basis. He concludes that both mine capacity in excess of mill-feed requirements and the inventory levels of in-process ores are the elements which create the 'margin of safety' which permits mine production requirements, as set by mill capacity, to be met without undue stress.

The mill capacity at the Texasgulf operation has been set at a level compatible with mine capacity. Moreover inventory, equipment and labour margins have been established within the mining operation. Texasgulf derives an economic benefit from maintaining the margins which it has established. In addition to the safety and employee-morale benefits which it has derived, Texasgulf has avoided all unplanned mill stoppages over a fifteen-year period. The grade of the ore body, the life expectancy of the mine, the cost of producing a given quantity of ore and the financial position of the company are variables which will significantly impact upon the cost-benefit equation associated with the adoption of a margin of safety. It is to be further observed that existing mines may be restricted by existing facilities and equipment in contrast to mines in the development or design stage, where opportunities exist to fix appropriate mine-mill capacity relationships.

Based on a consideration of its principle effects, an economic justification of a margin of safety will vary with the characteristics of the specific mine. We recognize that the concept as applied at Texasgulf may impose economic penalties on marginal operations which may lead to unprofitability. We accept that the margin of safety concept as applied in its specifics at Texasgulf may not be transferable to all other organizations. Having said this, however, we are satisfied that the

concept, as a model for decision-making, has general application regardless of the physical characteristics or financial viability of a mine.

Although it may not be possible to recreate the margins which exist at Texasgulf, it is our belief that the process of reviewing the adequacy of the margins within an organization and improving margins wherever practical will contribute to improved safety performance. At the very least, the critical relationship between mine output and mill capacity is identified as a factor to be considered in operating and design decisions. It seems to us that the process of applying the concept goes hand in hand with the concurrent setting of production and safety goals and the allocation of resources adequate to reconcile the two. In our view, it is incumbent upon the chief executive officer, through his senior management, to apply the concept within the economic parameters of his organization and to thereby create feasible margins of safety within his organization.

Having applied the margin of safety concept and having achieved an acceptable level of equilibrium between safety and production targets, the scope for line management trade-off between safety and production is considerably reduced. Line management is given safety and production goals which are attainable within the context of the particular organization. This is not to say, however, that line management will not be faced with day-to-day operating decisions which require some balancing of safety and production considerations.

It is incumbent on the chief executive officer to manifest his commitment to safe production further by making it clear that within the framework of the overall goals which have been set, day-to-day decision-making is to be predicated upon the understanding that safety is the overriding consideration. While the achievement of the longer-term overall goals is required, the chief executive officer must ensure that worker safety governs the short-term approach of line management.

Suffice to say at this point that the chief executive officer must make it clear to line management and supervision that decisions which do not sufficiently reflect the organization's commitment to safe production will be harshly received within the organization. The result is to reduce further the scope for trade-offs at the lower levels of the organization; trade-offs which may call into issue the company's commitment to safe production.

We deal separately with first line supervision, the safety department and the joint health and safety committee. Many of the recommendations contained under these separate headings are also matters for the attention of the chief executive officer. The chief executive officer must ultimately determine the role to be played by the safety department, the company's approach to communication and joint consultation and the manner in which it utilizes its first line supervisors. It is incumbent upon the chief executive officer to resolve these issues through his executives and senior officers in a manner consistent with his personal commitment to safe production. The recommendations contained under these separate headings are designed to assist in this regard.

Having established the commitment to safe production, and having made the resource allocation decisions necessary to bring safety and production goals into an acceptable equilibrium, the chief executive officer must assign responsibility within the line organization and provide the necessary authority to allow line managers and supervisors to attain the goals which have been set. A clear allocation of responsibilities will facilitate the integration of health and safety policy objectives into organizational activities so that the criteria for the recruitment and selection of new employees is defined, the training of employees is carried out, safety awareness and proper attitudes

are instilled, relevant data is collected and analysed and proper work standards are developed.³ In addition, the clear allocation of health and safety responsibilities allows senior management to attribute performance failures to the individuals responsible.

The capacity to attribute performance failures to the individuals responsible highlights a fundamental area of senior management responsibility which we believe to be essential to superior safety performance. We refer to the requirement upon the chief executive officer to hold all levels of the line organization responsible for achieving safe production. We have discovered that first line supervisors (the lowest level of line authority) are held accountable for safety performance within all organizations, but that, unfortunately, accountability for worker safety often diminishes as one proceeds up the line.

The superior performing companies are the clear exception. If the desired results are to be achieved, accountability for safe production must extend upward from the worker through the first line supervisor, mine captain, mine superintendent, mine manager and vice-president to the president of the company or division responsible for the operation. It is incumbent upon the chief executive officer to put in place a system which acknowledges and rewards the individual who achieves safe production and which at the same time, serves as a disincentive to the supervisor, manager or executive who is unwilling or unable to maintain a satisfactory level of safety performance within his area of responsibility. Salary increases, promotions and other forms of recognition should take safety performance into full account.

The president of the Ontario Mining Association revealed to the Commission that, in his view, the single most important

³ See: James V. Findlay, *Safety and the Executive*. Loganville, Georgia: Institute Press, 1979; pp. 75-6

issue facing the industry today is safety. The failure of the industry to achieve satisfactory safety performance has tarnished its image, brought it under close public scrutiny on two occasions over the past six years, cost it millions of dollars and brought unnecessary physical and emotional pain to its workers and their families. When the impact of the industry's failure to achieve better safety performance is considered in its broadest dimension, little more need be said concerning the necessity for the chief executive officer of each mining company to assume the full range of his health and safety responsibilities. Having regard to the foregoing, we recommend:

that the chief executive officer of each mining company operating in Ontario review his personal commitment and contribution to the safety performance of his organization with a view to exercising his authority and leadership in the manner outlined.

The identification of the chief executive officer as the individual with the greatest influence over safety performance has broad implications for government policy and programs. In its submission to us the Ontario Ministry of Labour, while emphasizing that the prime responsibility for worker safety rests with employers and workers, described its role as follows:

'The government's task is to take the lead in establishing and maintaining this framework (the internal responsibility system created by the legislation) and to ensure that it continually exerts a positive influence on all aspects of work safety ranging through such diverse matters as worker attitudes, the quality of equipment used, the layout of mines, plants and other workplaces, training and many more.'

If the government is to play the role which it has cast for itself (which is the appropriate one in our opinion), it must recognize the importance of the chief executive officer and develop

approaches designed to identify and motivate those chief executive officers who have not assumed the full range of their health and safety responsibilities and to reinforce the efforts of those who have.

The Mining Health and Safety Branch of the Ontario Ministry of Labour is currently developing the capability of maintaining an ongoing safety profile of each mine or mining plant operation upon which, among other things, to base the pattern and frequency of its inspections. The profile takes account of accident frequencies and violations at each operation over which the branch has inspection responsibilities. This type of information base, coupled with a more subjective assessment of the quality of the relationships and the functioning of the committee structure at each individual operation, will allow the branch to identify those operations which exhibit satisfactory safety performance and those which do not.

We fully support the concept that inspection patterns be based on performance. We believe, however, that where an operation (as distinct from a company) is identified as a substandard performer, officials from the branch should meet with the manager of the operation or his equivalent in order to review his performance and to develop an appropriate branch response. The branch's response may take the form of increased inspection, a detailed review of the safety system in place, suggestions for company initiated activities, etc. In addition, the director of the branch should notify the chief executive officer of the company by registered letter that one of his operations has been identified as substandard and that branch officials will be meeting with the manager of the operation to discuss the unsatisfactory safety performance and to devise corrective action. This approach allows the branch to proceed

in an open manner and, as importantly, establishes an intra-company dynamic which is likely to contribute to improved safety performance. We recommend:

that where the Mining Health and Safety Branch identifies an operation as substandard, the district engineer meet with the manager of the operation to review performance and to advise of the branch's response; and further, that the branch so notify the chief executive officer by registered letter.

If a number of operations within a corporate organization are identified as substandard or if an individual operation is shown to be chronically substandard, the branch may reasonably assume that the chief executive officer has not made the necessary commitment or, if made, has not seen to its implementation. In these circumstances, the director of the Mining Health and Safety Branch should meet with the chief executive officer in order to review the substandard performance of his organization (or part thereof) and to advise of the branch's response. We recommend:

that where the Mining Health and Safety Branch identifies a company as having substandard performance, the director of the Mining Health and Safety Branch meet with the chief executive officer of the company to review performance and to advise of the branch's response.

Apart from the moral, social and legal reasons which underpin a strong commitment to safety performance, the direct financial costs associated with poor safety performance surely serve as an incentive to the chief executive officer of any organization to require safe production. Beyond the direct costs of compensation, the company is burdened with the indirect costs associated with lost time, post-accident production losses, accident investigation, damage to property, etc. The United

States Bureau of Mines has been conducting a cost analysis of work-related injuries and deaths in underground coal mines. The initial study dealt with the 1974 injury experience and, on the basis of the model developed, computed the total cost of 9,286 accidents at \$56.9 million. A second study for the period 1975-79 has yet to be released. The Bureau has now begun an analysis of the cost of accidents in metal mines in the United States. These models will indicate the cost of accidents to a company and to the industry. It is hoped that these cost indicators will provide additional impetus to accelerate and expand efforts aimed at improved safety performance. We believe that it is essential that accident costs be computed in order to underscore the financial implications and thereby to serve as a further incentive to improved safety performance. We recommend:

that the Mining Health and Safety Branch review the cost indicator models being developed by the United States Bureau of Mines for metal mines and assess their applicability to Ontario mining operations. Using these cost indicator models or some modification thereof, the costs of accidents to each mining company (by operation) be computed on an annual basis.

Mines and mining plants in Ontario are operated by companies or by subsidiaries or divisions of companies which have share-owner-investors to whom the company, through its board of directors, must report periodically and publically. A company's safety performance directly impacts upon its employee and union relationships and the image it portrays to employees and owners (both existing and potential), governments, other institutions and the public. Ultimately, safety performance impacts upon a company's earnings. We are concerned that insufficient reporting of safety performance and programs

detracts from the priority which this matter deserves and we believe that more formal reporting requirements are called for. Accordingly, we recommend:

that a company operating a mine or mining plant in Ontario include in its annual report a comprehensive statement of safety performance including relevant comparative data and a statement of costs incurred.

Workmen's compensation costs in Ontario are borne by the employers who operate within the province. The rationale which supports this arrangement is reviewed at pages 13-15 of the recent Weiler Report, 'Reshaping Workers' Compensation in Ontario'. In return for underwriting the cost of medical services and compensation for injured workers, employers are made immune from civil lawsuits arising out of damages resulting from workplace accidents. However, each employer does not pay the same percentage of payroll into the compensation fund. In order, among other things, to accommodate the varying degrees of risk which attach to different types of work, 108 rate groups have been established. Each employer is placed in one of these rate groups and its assessment is based on the experience of the group.

There are about 587 companies listed by the Workmen's Compensation Board under class 5; the classification encompassing all of the companies in the mining industry. However, only about 60 of these are active. Within the class 5 employers, there are eight separate rate groups—gold mining (7 companies), iron mines (4 companies), miscellaneous minerals (18 companies), nickle mines (2 companies), uranium mines (6 companies), diamond drill contractors (7 companies), mine contractors (15 companies) and prospectors (unknown number). With the exception of a possible double assessment which the Workmen's Compensation Board can impose, the rate paid by each firm is determined by the performance of the

rate group as a whole and is the same as for the other members of the group.

The Workmen's Compensation Board is presently devising an experience rating plan whereby an individual employer would receive either a refund or surcharge depending on his individual safety performance. The objective of such a scheme is to reinforce efforts of the employer who has established a sound accident prevention program and made the investment necessary to support it. At the same time, the objective is to impose an economic penalty on the employer who has not made the necessary commitment and investment.

The conclusions in the Weiler Report with respect to: the best measure of comparative safety efforts (accident frequency); the impact of the serious accident (the average cost of serious accidents each year within the rate group should be averaged and only that average cost should be imputed to the individual employer who has such an accident); the time period over which experience should be measured (three years); and the quantum of the annual refund or surcharge (to a maximum of 100 per cent of the previous year's assessment bill); appear sensible to this Commission.

The underlying purpose of experience rating is to improve accident prevention efforts by providing economic incentives or penalties. If experience rating is to have the desired effect within the mining industry, certain adjustments will have to be made to the traditional rate groupings within the class. The number of individual mining companies within each rate group, compared to construction or manufacturing is so small as to inhibit the proper application of the incentive principle. For example, the nickle and uranium groups, which employ the bulk of the workers in the industry, are each comprised of only a very few employers. In effect, where there are only two, one employer competes against the other and their performance relative to the industry is immaterial in terms of

compensation assessments. If the performance of the two nickle companies, for example, is better than the industry as a whole, then one of the companies would nevertheless pay a surcharge and the refund paid to the other would be less than it should be, given its performance relative to the industry. On the other hand, if the performance of both companies is below the industry average, one of the two companies would receive a refund. The effect is to undermine the primary purpose of an experience rating plan as it should apply to the mining industry.

We believe that an industry-wide scheme is both practicable and necessary. It is recognized that there may be good reason to segment the industry for purposes of assessment having regard to the risk of industrial disease. However, we suggest that consideration be given to establishing a single group comprising all mining companies for the purpose of accident experience rating. (Separate groupings for different types of contractors may be required.) A properly tailored merit rating scheme would serve to further reinforce the efforts of the chief executive officer and the organizations which are committed to safe production and would serve as a disincentive to those who are not. We recommend:

that a workmen's compensation merit rating scheme, tailored specifically to the mining industry, be introduced.

The Mines Accident Prevention Association of Ontario is considering the adoption of an industry-wide audit program which, among other things, effectively rates member companies in terms of safety performance. The program under consideration is 'The Five Star' program which is marketed by the International Loss Control Institute in Atlanta, Georgia and is used extensively in the South African mines. The plan is designed to allow for an independent and objective audit of the safety system in place in an operation and to rank each

operation relative to others on a scale of from one to five. The Industrial Accident Prevention Association of Ontario has modified the plan to provide an overall ranking on the basis of both safety activities and accident frequencies. We have been told that where the program is in operation, it has generated positive results including healthy competition between participants. Moreover, the program would allow the chief executive officer and his senior executive to assess the relative worth of the safety program they have in place as measured against objective criteria. We favour the adoption of such a program, modified as necessary to fit the industry. We recommend:

that the Mines Accident Prevention Association of Ontario carry out independent safety audits and that each mining company operating in Ontario consent to having the MAPAO perform an annual safety audit.

that the individual companies be ranked on the basis of the audit results and that the ranking be made public by the MAPAO.

First Line Supervisor

It is the chief executive officer, through his senior management, who establishes management's commitment to safe production, sets the operating objectives, allocates resources, monitors performance and imposes accountability throughout the organization. The chief executive officer establishes the framework within which it is possible to minimize the risk of accidents and injuries at work. Even where such a framework is in place however, the level of actual performance is, in large measure, a function of the quality and utilization of first line supervision.

Accidents arise out of the act of work and are, in large part, the result of worker attitude. The first line supervisor plans, assigns and supervises the performance of work and therefore bears a direct responsibility for the manner in which, and the conditions under which, work is performed. The first line supervisor represents management in the eyes of the individual worker and therefore he is also in a position to help shape worker attitude and reaction to management policies by his example, his influence and the exercise of his authority.

The job of a first line supervisor in a mining environment is demanding in the extreme. The first line supervisor must manage and reconcile a sophisticated technical system and a multi-faceted social system. Even within an organization where a demonstrated commitment to safe production exists, a first line supervisor is under pressures from his managers above and from his workers below. As noted, the manner in which the first line supervisor carries out his function will be determinative of how work is performed and how workers respond to the policies of management.

The workshops which we conducted with randomly selected first line supervisors from five mining companies were undertaken in recognition of the critical nature of the first line supervisor's responsibilities. We were impressed with the knowledge, sensitivities and concerns of those in the groups with whom we met. While we are not qualified to judge their

technical competence, we would be surprised if these supervisors could not meet very high technical standards. Having said this, however, we are nevertheless convinced that steps can be taken to better ensure that the supervision of miners and mine plant workers is undertaken by the most competent individuals available and that these individuals are brought to a uniformly high level of qualification in all relevant disciplines.

First line supervisors are recruited primarily from the ranks of experienced workers and, to a lesser extent, from among graduates of engineering and mining schools. The recruitment of experienced workers, with an understanding of the operation from the worker's perspective, is preferred by the Commission. If experienced workers are to be attracted however, the rewards must reflect the value which is placed on the position and be commensurate with the responsibilities. Underground production miners are paid a base rate plus an amount determined by the quantity of ore produced during a given period, usually one month. An above average miner can earn in excess of 50 per cent of his base rate as production bonus. Suffice at this juncture to observe that the bonus system in place at all but two companies within the province distorts the normal salary relativities found in most manufacturing or processing organizations. In most such organizations the first line supervisor, in recognition of his responsibilities and his status, is paid more than those he supervises. However, in the mining industry, the miner is offered the opportunity of earning more than his supervisor and many of them do. This type of compensation arrangement inhibits the movement of competent and experienced miners (the highest bonus earners) into the supervisory ranks and downgrades the status of the first line supervisor's function within the organization. This negative by-product of the bonus system must be considered in assessing the value of the bonus system and its impact on safety in the workplace. This assessment and our recommendations in respect of bonus remuneration are set out later in this Report.

The training of supervisors is carried out to the standards and level set by each mining company. Although complaints were recorded before the Commission with respect to the competence of first line supervisors and their lack of training, we have not been convinced that the technical competence of first line supervision in the Ontario mining industry is seriously deficient. Indeed, one would expect experienced and competent miners, given the training which is in place, to be technically knowledgeable of the operations which they supervise. There can be no argument, however, that the overall quality of first line supervisory training is uneven. Furthermore, we are not satisfied that the existing training programs sufficiently develop the management and communication skills so necessary in achieving safe production or that these programs sufficiently familiarize the first line supervisor with existing health and safety legislation and his legal responsibilities.

The example set by the industry in developing and delivering the common core modular training program for new miners has application to the issue of supervisory training. The purpose of a common core approach for new miners is to ensure some uniformity of entry-level competence and, to a lesser extent, to ensure that the basic training, when followed by advanced or specialty training, raises the status of the hard rock miner to something paralleling an apprenticed tradesman. The common core program was developed through tripartite consultation so that the best ideas of the various companies and unions and government were brought to bear with the result that the excellence of the program is acknowledged from all sides. We believe that the significant decrease in the accidents suffered by inexperienced miners during the period of its existence is, in large measure, attributable to the common core modular training program. An advanced or specialty training program is likewise being developed on a tripartite basis. We believe that a tripartite effort directed to supervisory training would

produce an equally effective modular training program. Such a program would also enjoy broad based support and would most certainly improve safety performance by producing even better qualified and more respected supervisors.

It has been urged upon us to recommend government certification of first line supervisors along the lines of the systems in place in British Columbia and Nova Scotia. In these jurisdictions, the provincial government develops a series of examinations on a wide range of subject matters and these are in turn administered by a board of examiners. The same approach is followed in parts of the United States. Successful completion of these examinations leads to certification as a qualified mining supervisor. When reference is had to the track record of the Ontario mining industry in developing an industry-wide modular training system, we are compelled to reject the concept of government supervised examinations as a means of raising the overall competence of first line supervisors. In our view, a properly developed industry-wide modular training program administered by the individual companies would be a more effective and preferable way of achieving the desired result.

We are confident that the interchange and discussion of ideas between companies, unions and the government would result in a program superior to anything in place. We envisage, as a minimum, broad areas containing modules covering technical matters, human relations, communication, ground control⁴ and health and safety (including the Act and regulations). Units or modules dealing with technical aspects of the employer's operation could be adapted to reflect the facilities, processes and methods of the individual company. This would make the program more directly relevant to the supervisor's actual

⁴ An outline of a proposed ground control module is contained in the paper prepared by Professor Peter Calder, Head, Department of Mining Engineering, Queen's University, which is reproduced in Volume II of this Report.

working environment than would study and preparation for government examinations. The health and safety module, as the product of tripartite consultation, will quiet whatever concerns exist that supervisors are inadequately trained in this area and may lead to greater worker and union support for those who act as first line supervisors. In addition, the health and safety module, as a product of tripartite consultation, might well provide the framework for joint supervisory/health and safety committee training.

A modular training program for first line supervisors which draws on the combined resources and ideas of the various mining companies, the unions and government will provide a framework for the development of first line supervisors which is far superior to government-set and administered examinations. Where the company is responsible for administering the program, the company has the opportunity to assess the candidates against established performance standards. As the party responsible under the statute for providing competent supervision, it is the company who should decide if an individual is competent to supervise. On the other side of the ledger, the setting and administration of government-run examinations would require an allocation of substantial government resources which, in our view, should be allocated to other more worthwhile initiatives. The industry has proven that it is capable of developing and delivering modular training systems and should be given the opportunity to apply its expertise to the area of supervisory training.

Having regard to the foregoing we recommend:

that a committee be struck, with representatives of the mining companies, the unions representing workers in mines and mining plants and the government, for the purpose of developing a modular training program for first line supervisors in both underground and surface

operations and that individuals be certified by the company conducting the program as competent to supervise in a mine or mining plant upon successful completion.

that from the date the program commences, only persons who have such certification be appointed to fill regular first line supervisory positions.

that persons occupying first line supervisory positions as of the date the program commences, be required to complete the program and become certified within a reasonable time period stipulated by the tripartite committee.

Even if the most promising workers could be attracted to seek advancement to the supervisory ranks and even if these candidates were given the benefit of a comprehensive modular training program, the effectiveness of first line supervision remains dependent upon the manner of utilization. From our observations, first line supervisors are used in essentially the same way, whether they are assigned to a surface or an underground operation.

Surface operations are similar in many respects to the traditional factory setting where first line supervision is responsible for the quantity and quality of production emanating from a defined work area, whether it be a floor, a department or a section. Normally, the first line supervisor works from an office area which is within, or adjacent to, the work area over which he is responsible and from which he is able to maintain ongoing visual or personal contact with those working within his area. For the most part, workers are assigned to operate stationary pieces of equipment from permanent work stations. In an underground production setting, where a high proportion of mining industry fatalities have historically taken place, workplaces are not static, but changing. The work area is not cubic

but linear, and the work environment is not easily controlled. The underground work environment has been characterized as hostile. As a result, the production process is more difficult and uncertain underground and the risk of serious accident or injury to those who work there is greater.

These difficulties are compounded by the physical restrictions which encumber the supervisory effort in an underground work setting. Continuous supervisory contact, as is possible in most plant or factory settings, is not possible underground. The current ratio of first line supervisors to underground workers is held at between 15:1 and 25:1 in the Ontario mining industry. With these ratios the number of workplace contacts between supervisor and worker is limited to one or two per shift. In a very real sense, therefore, the miner works without direct supervision. This is a factor upon which we will rely in suggesting a realignment of production responsibilities. When we consider the number of fatalities and serious accidents which occur underground, the increased risks faced by workers underground and the importance of supervisory influence, we are convinced that the low level of supervisory contact is a factor inhibiting safety performance in underground operations. However, the industry is faced with very real constraints in this regard. While some minimum level of coverage must be maintained, it is unrealistic to expect anywhere near the level of contact which is possible in a surface operation.

The level of workplace contact by supervisors is a function of the distance between workplaces, the number of supervisors assigned and the time available to each supervisor for this purpose. A considerable number of first line supervisors spend upwards of two hours per shift time-keeping, maintaining production records, ordering supplies and performing other paper-work duties. A number of company representatives expressed concern that the first line supervisor is becoming

over burdened with paper-work to the detriment of his direct supervisory functions. Indeed, at least two companies are presently reviewing this matter. Having interviewed a number of first line supervisors, we are satisfied that the time spent at desk work by first line supervisors has increased substantially in recent years. Clearly it is open to the companies to provide first line supervision with increased clerical and technical support⁵ which would result in additional time for workplace contacts. In any event, we recommend as a necessary minimum:⁶

that the number of first line underground supervisors employed by each mining company be sufficient to allow for at least two workplace contacts with each crew per shift and that the time allotted for these visits be sufficient to allow for adequate assistance and instruction to inexperienced crews and crews working in difficult areas.

If we thought that three or four supervisor/worker contacts per shift would substantially improve underground safety performance, we would recommend that the minimum coverage be increased accordingly. However, we have not been so convinced. Whether the worker is visited two, three or four times per shift, the fact remains that he is unsupervised for most of his workday. Rather than suggest that the minimum coverage be increased beyond a level which the industry can easily achieve, we have looked to alternative means of ensuring that workers are adequately assisted and motivated to work safely.

⁵ The Commission is aware that rapid advances are being made in the field of microcomputing. Two hand-held systems have been brought to our attention. These are inexpensive, have alphanumeric capability and can be easily programmed. In our view, these microprocessing systems could be effectively applied to reduce the time required for record keeping and paper-work by first line supervisors.

⁶ The Commission notes that the current regulations require three visits per shift in the case where a worker is assigned to work alone underground and we propose no change in this respect.

We were told on a number of occasions that older experienced miners were largely responsible for training new recruits prior to the introduction of the modular training program and that, even today, the inexperienced miner is beholden to his experienced workmate for much of his on the job know-how. We noticed during our tours of underground operations that younger inexperienced miners were often paired in work crews with older experienced miners. Although the industry's ability to provide additional direct supervision is constrained by the underground environment and the resources available to it, a company's capability to use group leaders is not so constrained. Indeed, an informal group leader structure is already in place. Where the structure is informal, however, the additional responsibilities are not recognized and there can be no accountability. In order to work effectively, a group leader system must be based on payment of a premium beyond the base rate which recognizes the responsibility assumed. Many organizations use group leaders to help direct the work effort in accordance with standard work practices where supervisory coverage is strained for one reason or another. The underground mining environment provides an ideal setting for a more extensive use of group leaders and we recommend that the industry support its supervisory effort in this manner. Where production workers are unionized, group leaders are likely to be included in the bargaining unit. To give full effect to our recommendation with respect to group leaders will require accommodation on the part of the bargaining agent, especially in respect of the application of seniority rules.

Group leaders with responsibility for directing work at the face, providing advice and guidance to the younger inexperienced miner and assisting in evaluating the skill levels of those with whom they work, would improve the industry's safety performance. This improvement would be realized not

only because of the direct impact of the group leaders, but also because of the additional flexibility given to the supervisor.

Accordingly, we recommend:

that wherever practical, a minimum of two group leaders for each first line underground supervisor be appointed.

We have drawn attention to the fact that in an underground operation, the supervisor does not have the same measure of ongoing control over the production process as a supervisor in a surface operation. Underground supervision is intermittent at best. Because of the nature of the work setting, the individual crews essentially determine their own pace and level of output. The companies have recognized the limitations upon the underground production supervisor in this regard by instituting the production bonus system. In our view, however, mining companies have not fully adapted the role of the underground supervisor to the conditions which exist in an underground work environment. The limitations upon first line supervisory staff in an underground setting and the capability of individual crews to influence production levels suggests the need for shift in emphasis, if not a realignment of responsibilities, if the objective is to maximize safe production.

Rio Algom Mines advised the Commission that it had instituted a program to increase the involvement of individual workers in the planning of their work. The outstanding attendance and safety performance demonstrated by the crews under the supervision of a particular shift boss caused the company to determine the reason. The company discovered that this supervisor, who had been hired from outside the company, significantly involved his crews in the planning of their work, discussed with them in advance the mining maps and surveys and engaged them in a daily update with respect to the supplies and equipment needed to accomplish the day's work.

The miners under his direction were ultimately involved in work-related planning and decision making and had responded with attendance and safety performances which brought their supervisor to the attention of management. Rio Algom is attempting to expand this approach.

We observe at this point that the management system in place at Texasgulf, where safety performance is the best in the industry, is also based on open communication and a high level of worker involvement in work-related decisions. We believe that this management style has a positive effect on worker attitude and, concomitantly, on worker safety.

The results of the Rushton experiment⁷ and the experience at the Campbell Chibougamau Mine in Quebec, following a massive re-organization in 1975⁸ have reinforced the conclusion of the Commission in this regard. In both cases, the effect of making workers responsible for many of the decisions pertaining to their daily work and thereby providing the supervisor with a larger responsibility for planning and motivation, contributed to improved safety performance. In these circumstances worker attitude improves and the first line supervisor is better able to plan for supply requirements, see potential breakdowns before they occur, plan for the systematic repair of equipment and to place daily production within the context of broader requirements. The researchers who undertook the Rushton experiment maintain that the production responsibilities of the first line supervisor should be 'to provide information to crew members, to help them use that information most

⁷ Triste E.L., G.I. Sussman, G.R. Brown, 1977, *An Experiment in Autonomous Working in an American Underground Coal Mines*, Human Relations 30. 3 pp. 201-236. The Commission met with both Eric Triste and Grant Brown, two of the researchers who conducted the Rushton experiment.

⁸ See Strassen J.B. *A Fresh Approach to Mine Organization and Incentive Planning Based on Experience at Campbell Chibougamau Mines Ltd.* The Canadian Mining and Metallurgical Bulletin, Volume 74, No. 826, February 1981.

effectively and, in discussion sessions, to facilitate the development of consensus concerning activities to be carried out during the shift.' Both the Rushton experiment and the Campbell Chibougamau experience serve to confirm the desirability of refocusing the responsibilities of the underground supervisor.

The hierarchical control systems which typify industrial organization have remained the norm in the Ontario mining industry. In the underground operations in particular, where limitations upon the traditional organizational and management systems have been recognized, it is difficult to comprehend why the industry has been reluctant to consider new approaches. Where the autonomy of a work group is already established as it is in the case of most underground workings, the major and conventional obstacle to change is absent. In a situation where the work group is quite autonomous already and has a significant measure of control over output, the logical working arrangement, in our view, is to shift responsibility for day-to-day production to the individual crew or, at the very least, to involve the crew in all aspects of work planning. The utilization of group leaders would facilitate a move in this direction. It is our conclusion, based on the Texasgulf experience, the information given to us by Rio Algom, the Campbell Chibougamau re-organization and the Rushton experiment, that where workers are more involved in the planning of their work and are assigned responsibility for meeting production targets, attitude and commitment improve and so also does safety performance. It seems, as well, that where worker responsibility for day-to-day production is in place, the supervisor is better able to facilitate the operation of the technical system. He is better able to plan work methods, maintenance schedules, meet manpower needs and to identify hazards and minimize or eliminate them. Accordingly, we recommend:

that individual work crews be more involved in the planning of their work and, in conjunction with group leaders, be made responsible for achieving short-term production targets.

that first line supervisors assume an enlarged role as facilitators, resource persons, planners and safety auditors.

Section 37(1) of the *Occupational Health and Safety Act 1978*, provides that every person who contravenes or fails to comply with a provision of the Act or the regulations or orders thereunder is guilty of an offence and on summary conviction is liable to a fine of not more than \$25,000 or to imprisonment for a term of not more than 12 months, or both. Section 37(2) provides that on a prosecution for a failure to comply with section 16(1) (the section which requires a supervisor to ensure that a worker works in the manner and with the protective devices, measures and procedures required by the Act and regulations and uses the equipment, protective devices or clothing the employer requires to be used), it shall be a defence for the accused to prove that every precaution reasonable in the circumstances was taken. These sections establish the extent of the first line supervisor's liability under the Act. It should also be noted that the worker and the company may similarly be prosecuted for violations of the Act and regulations. Supervisors in this industry have been prosecuted following recent fatalities. The institution of these prosecutions has caused considerable concern throughout the industry.

Our discussions with first line supervisors revealed a deep anxiety with respect to the extent of their liability under the Act. Individual supervisors spoke passionately about their concern that, notwithstanding their best efforts, they could be prosecuted under the Act and, if convicted, left with the stigma of a 'criminal' record. Supervisors spoke of the difficulty of supervising in a mining environment (difficulties which are

acknowledged) and about the unfairness of being subject to prosecution as a result of events over which they may have little or no direct control. First line supervisors are genuinely concerned and a number hinted at a desire to return to the work force rather than face the possibility of prosecution. It is acknowledged that the recruitment of first line supervisors, a difficult task at the best of times in the mining industry, has been made more difficult as a result of the liability to which a working man may expose himself if he takes on the role of a first line supervisor.

We are sympathetic to the concerns of the first line supervisor in this regard. However, it is our view that it is essential that the duties of the supervisor, and others, in providing for worker safety be spelled out in the statute and, further, that these provisions are sufficiently important to warrant the possibility of a prosecution in a proper case of noncompliance. The extent of the first line supervisor's potential liability lends further support to our recommendations for comprehensive modular training for supervisors, the use of group leaders and a re-alignment of worker/supervisor responsibilities. This is not to say that a prosecution should be initiated against the first line supervisor as a result of every serious accident. There are limitations upon the first line supervisor which must be recognized. It is the supervisor who clearly has failed to take every precaution reasonable in the circumstances who should be considered for prosecution under the Act.

The concern expressed to the Commission goes well beyond the small minority of supervisors who may conduct themselves in a manner which is likely to attract a prosecution under the Act. We suspect that at the present time the general concern is being fueled by fear of the unknown. The direction the Mining Health and Safety Branch and the ministry intends to take in administering the statute *vis-à-vis* the prosecution of first line supervisors is not altogether clear although it does appear to the Commission that the branch has decided to institute

more prosecutions than in the past. Furthermore, the courts have not yet made a definitive pronouncement on this delicate issue. Without considering, at this juncture, the approach which should be taken to the prosecution of an individual company, we believe that the ministry should seek to prosecute first line supervisors only when satisfied that a first line supervisor has failed to take every precaution reasonable in the circumstances or is otherwise clearly negligent in complying with the Act and regulations. We believe further, that the branch should make known its policy in this regard so as to alleviate the fears and apprehensions of many of the first line supervisors who play a crucial role in the industry's safety effort. Without suggesting the ministry alter its approach to the prosecution of companies, we recommend:

that the ministry adopt an even-handed and consistent practice with respect to prosecutions and make known to the industry that it will not seek to prosecute a first line supervisor or any other employee unless satisfied that he or she has failed to take every precaution reasonable in the circumstances or has otherwise clearly acted negligently in complying with the Act and regulations.

Worker

We have been told that a majority of accidents result from unsafe work practices engaged in by individual workers. While we agree with Dr. Ham that the distinction which some attempt to draw between unsafe practices and unsafe conditions as the cause of accidents is an over simplification, the fact is that the individual worker has a large measure of discretion in a mining environment as to how work is performed. Hence, the individual worker is a key player in any program of accident prevention.

The individual worker must know and understand standard work practices and what is expected of him. Equally important is the attitude of the individual worker towards his work and the care he is prepared to exercise in carrying out his work. Worker attitude, in large measure, is a product of the overall working environment and is often a symptom of management failure or neglect.

Management possesses the authority and the resources to select and train its workers, provide competent and effective supervision and to create a favourable working environment. If management fails in these endeavours, it is unlikely that positive worker attitudes will prevail. However, there should be no mistake that the worker is part of the internal responsibility system and bears responsibility for himself and his workmates. The duties of a worker, in so far as the law is concerned, are spelled out in the Act and regulations. The worker is required to:

- work in compliance with the Act and regulations,
- use or wear the equipment, protective devices or clothing that his employer requests to be used or worn.

- report to his employer or supervisor the absence of, or any defect in, any equipment or protective device of which he is aware and which may endanger himself or another worker.
- report to his employer or supervisor any contravention of the Act or the regulations (which includes any contravention by a fellow employee) or the existence of any hazard of which he knows.

The worker, at a minimum must know, understand and assume these obligations. In addition, workers must be prepared to take a responsible stance in respect of the need to find an alternative to the bonus system of compensation and to experiment with improved lighting systems. We have also suggested in this Report that there is a special role for the worker to play in any work-related alcohol or drug abuse program. We recommend:

that each worker review his commitment to safe work practices and undertake to work in a safe manner at all times and to assume the full range of his responsibilities as a member of the direct internal responsibility system.

Contributive Responsibility

Joint Health and Safety Committee

The health and safety committee is envisaged in the Ham Report as a mechanism to facilitate consultation, the flow of information and the exchange of views by workers and management. Workers and management are central players in the direct responsibility system. Therefore, the health and safety committee, although not part of the direct responsibility system, plays a key contributive role. These committees support the direct responsibility system by:

- providing a mechanism through which workers contribute to the formulation of policy and programs, the assessment of new facilities, equipment and processes and the setting of safety goals and objectives. The understanding, attitude and commitment of the worker, as a critical participant in the direct responsibility system, is thus improved.
- providing a mechanism by which worker insights and concerns with respect to management policies, programs and the working environment are communicated to management. The quality of the decision-making emanating from within the direct internal responsibility system is thus provided.
- providing a vehicle by which a company and the union representing its workers may develop a non-adversarial approach to the day-to-day administration of health and safety matters. The absence of an adversarial approach improves the effectiveness of the direct responsibility system.

The establishment of a health and safety committee structure sets in motion a series of human interactions and creates expectations among workers and management. It follows that the manner in which a health and safety committee conducts itself is extremely important. If there is openness, if consultation

is meaningful, if workers are involved in the range of health and safety issues and can realistically view the committee as a means of affecting the manner in which, and the conditions under which, work is performed, the impact will be positive. If consultation is superficial, however, worker frustration and a reinforcement of the adversarial approach will ensue.

We have not been satisfied from our inquiries that the full potential of health and safety committees is being realized. It appears to us that, for the most part, committees are oriented, if not directed, to the identification and correction of specific workplace conditions. Dr. Ham reported that the majority of committees in operation at the time of his inquiry revealed 'a tendency to dwell on the disposition of specific anomalies to the exclusion of all else.' He referred to the failure of health and safety committees to reach beyond individual conditions as a failure to perform beyond the 'pragmatic level'. This Commission has also found that, in large measure, health and safety committees continue to operate at the pragmatic level. The failure of the committee structure to mature beyond this level rests with management, labour and, to some extent, with the statutory framework which has been put in place.

Health and safety committees which are primarily concerned with the identification and correction of workplace anomalies carry with them the potential to foster negative worker attitudes and to reinforce the adversarial mentality. We view the adversarial mentality as both a cause of committee failure and a result of that failure. It is a cause insofar as its existence prevents the openness necessary for meaningful consultation. It is a result of committee failure insofar as it tends to pit worker against management. If a committee deals with worker-initiated complaints to the exclusion of other activities, the worker and his representative find themselves in the ongoing role of initiator, and management finds itself in the ongoing role of responder. In the absence of defined tasks and consultative activities, the participants are denied the opportunity to work

together in a problem-solving mode. If a committee operates at the pragmatic level, the roles played by the respective participants invite an adversarial approach. Even if management is receptive to employee-initiated complaints and responds promptly (which is not always possible), a committee operating without full consultation on substantive issues misses the opportunity to improve worker attitude. Moreover, where meaningful consultation is absent, the more likely result is the fostering of negative worker attitudes.

The Commission has given considerable thought to the reason why, for the most part, health and safety committees in the Ontario mining industry have failed to achieve their full potential. We have identified four distinct, yet inter-related, factors. The first of these is the system for worker inspection established under *The Occupational Health and Safety Act, 1978*. Dr. Ham recommended that statutory provision be made for the appointment in each mine and plant of worker-auditors. They would have the authority and responsibility to examine and report upon conditions of work pertaining to the health and safety of workers at sets of workplaces designated by management in such a way as to encompass all workplaces. Dr. Ham contemplated one worker-auditor for every 25 employees (approximately equal to the span of first line supervision in many mines) and that the worker-auditor would devote an appropriate part of one shift per month to the task of reviewing working conditions. Dr. Ham suggested that this review be conducted in the presence of a supervisor. Although the general principle of a worker's right to review the conditions under which he works has general application, Dr. Ham's recommendation for worker-auditors was made in the context of an extensive examination of health and safety in the mining industry. Dr. Ham was aware of the special circumstances existing in the mining industry which support the need for

worker-auditors on the scale he recommended and was equally sensitive to the need to deal with unsatisfactory workplace conditions at the workplace.

Work in a mine and, to a lesser extent, work in a mining plant, carries with it a degree of risk as great, or greater, than that assumed in most other types of work. Work in a mining plant requires contact with heavy equipment, heat, molten metal and toxic and corrosive chemicals. Work in a mine involves close contact with heavy equipment and the handling of explosives in confined spaces. The working environment is constantly changing, subject to ground collapse and is without permanent lighting in many areas. The nature of the work makes supervision difficult. A mining environment is uniquely different from other work environments and creates special needs for ongoing audit and inspection. Moreover, the level of employee turnover in a mining environment, as evidenced before both the Ham inquiry and this inquiry, is very high. High turnover necessitates the regular infusion of new employees into the mining and mine plant environment, which further underscores the special need for ongoing audit and inspection. Because of the special need and because it could be logically anticipated that a substantial number of workplace anomalies would be identified through the process of worker audit, the task facing Dr. Ham was to develop a system whereby all potential hazards and unsafe practices could be identified and dealt with at the workplace.

Dr. Ham suggested 'that there be one worker-auditor for every 25 employees, more or less', thereby tying the worker-auditor to the supervisor's span of responsibility. He also suggested that the supervisor accompany the worker-auditor on his monthly inspection. Those suggestions were designed to provide for sufficient frequency of inspection and, equally important, to provide for the correction of workplace anomalies by the supervisor in his own area. While Dr. Ham suggested that at

least two of the worker members of the health and safety committees be worker-auditors, he was explicit that it would be 'inexcusable for problems to be presented to the health and safety committee or to the mines inspection branch before the internal system of direct responsibility has been given the opportunity to act.'

The Occupational Health and Safety Act, 1978 is a piece of omnibus legislation covering workers generally in Ontario. Although many of the concepts incorporated into the Act are rooted in the Ham report, the legislation was drafted to cover a much broader constituency than workers in mines. In our view, the drafters of the legislation, perhaps because of the scope of its application, failed to take into account the special circumstances which exist in the mining industry when provision was made for worker inspection. Section 8(8) of the Act provides that 'the members of a (joint health and safety) committee who represent workers shall designate one of the members representing workers to inspect the physical condition of the workplace, not more often than once per month' While we endorse the concept of worker inspection, the method set out weakens the relationship between the worker-inspector (auditor) and the first line supervisor, as contemplated in the Ham Report. The legislated provision also tends to move the focus for the resolution of workplace anomalies from the direct responsibility system to the health and safety committee. In underground mining where the ever-changing environment gives rise to the potential for numerous anomalies exacerbated by high employee turnover, the result has been to constrain the effectiveness of health and safety committees. Such committees in the mining industry have become overburdened with the handling of specific conditions, in part because of the method of worker inspection provided in the Act.

What is needed is a system of worker inspection in mines and mining plants which is more closely integrated with the supervisory function and which moves the initial focus for correction

away from the health and safety committee to the first line supervisor. The approach proposed by Dr. Ham, which has not been carried through into legislation, has much to commend it. However, an alternative approach, which also addresses other concerns of this commission, is to increase the time available for worker inspection. If a fewer number of worker-inspectors were appointed, but on a more or less full-time basis, both the frequency and the quality of inspection would improve and there would be time available for the necessary follow-up at the workplace.

The Canadian automobile industry has voluntarily chosen a full-time worker representative approach. Although not required by law, the automobile manufacturers and the United Automobile Workers (UAW) have included in their collective agreements provision for a full-time worker-inspector in all plants employing more than 600 bargaining unit employees. The full-time union health and safety representative is appointed by the Canadian director of the union on the recommendation of the local union and can only be removed from his position by the Canadian director. This representative is provided with an office by the company and, although maintaining a close liaison with the company's safety department, works independently. He is appointed for an indefinite term although his performance is subject to review. He serves on the joint health and safety committee, but is not permitted to involve himself in local union politics or to hold other union office.

As far as we are aware, Denison and Rio Algom are the only mining companies to use workers as health monitors on a full-time basis. Rio Algom appoints full-time worker health monitors who are selected by the union. These monitors are attached to the company's safety department and perform radiation and dust monitoring. It was explained to us that this

type of monitoring can be done as easily by worker representatives as by anyone else and, because it must be done in any event, the appointment of worker-monitors does not involve additional cost to the company.

While Rio Algom advised the Commission that it is considering using worker representatives to do safety inspections as well, it explained that the subjective aspect of a safety inspection and the need to deal with fellow workers who may be working unsafely, is a major cause for concern. The company is fearful that a worker safety inspector will not initiate discipline against a worker who is working unsafely, with the result that the company, at additional cost to itself, would be required to employ its own inspectors to augment the worker-inspectors. Rio Algom would be predisposed to allow worker-inspectors to carry out the safety inspection function if confident that the worker-inspector would assume the full range of responsibilities.

The imposition of industrial discipline is not an end in itself, but a means to an end. In the case of the unsafe worker, the objective of the discipline is to alter the worker's behaviour so that he becomes a safe worker. With this fundamental objective in mind, we are not convinced that a worker-inspector would necessarily be unable to perform the full range of inspection responsibilities. The opposite view, which was put forward by a number of companies in addition to Rio Algom, (whose preparedness to use full-time worker health monitors evidences a progressive approach), suggests an over-reliance on industrial discipline.

We recommend elsewhere in this section that the joint health and safety committee in each company undertake a review of the effectiveness of discipline as a means of achieving safe work practices. However, even if we were to assume that discipline is being used as an effective tool, we are not persuaded that worker safety inspectors appointed by fellow workers would turn a blind eye to unsafe work practices. This is not

to say, however, that the automatic response of the worker-inspector would be to initiate discipline. With the exception of major violations, which the worker-inspector is duty bound by law to report to supervision (Section 17(1) (a) of the Act), his first inclination would likely be to counsel the unsafe worker.

Counselling initiated by a union-appointed worker-inspector is, in our view, at least as likely to cause a positive change in the unsafe worker's behaviour as the imposition of discipline by a supervisor. We believe that a well-trained and conscientious worker-inspector, appointed for a fixed term and beyond the sphere of local union politics, will not shrink from his duty (to fellow worker, company or union) to identify both the serious offender and the repeat offender. When confronted with the type of safety violation which normally might attract a written warning or a short suspension, he will be in a position to counsel the offender. His efforts in this regard are at least as likely to have the desired effect on the employee as the imposition of discipline.

Rio Algom stated that it is prepared to consider the use of worker safety inspectors if it could be assured that worker-inspectors could replace those presently performing the function, thereby avoiding duplication of costs. While we are not motivated by cost consideration to the same extent as the company, there is much to be said for allowing worker safety inspectors to perform in place of company safety inspectors. Transferring this responsibility would not only avoid additional cost, but would underscore a company's commitment to worker involvement and its belief in the capability of workers to respond positively to increased responsibility.

Having concluded that a fewer number of full-time worker safety representatives is to be preferred to a larger number of part-time inspectors, and having concluded that a full-time worker safety representative would perform the full range of inspection responsibilities, the difficulty lies in devising a

system of worker inspection which preserves the independence of the worker safety representative, but, at the same time, allows for sufficient integration with the company's safety department.

One option would be to appoint worker safety representatives in some reasonable ratio to the overall number of workers and assign these worker representatives to the safety department on the understanding that they would be free to respond to individual employee complaints and to report to the union. A second option would be to appoint a worker safety representative to each individual facility employing some minimum number of employees, as in the auto industry. Just as Dr. Ham's worker-auditor was expected to work within the supervisor's beat, the full-time worker safety representative, under this second alternative, would work within the area of responsibility of the facility manager.

We have decided that the second option is to be preferred. Although the worker safety representative could be used in place of the company inspector, the fact that he is not assigned to the facility by the company, but appointed by the union, preserves his independence. The perception that he is accountable to the workers in that facility will be maintained. Furthermore, his knowledge of the facility and the ongoing relationships he is in a position to establish with supervision at the facility weigh in favor of the second option. Having regard to the foregoing and to the special circumstances which exist in the mining industry, we recommend:

that provision be made in law for a full-time worker safety representative in each mine or mining plant employing more than 500 workers, and that where the number of workers in any mine or mining plant is less than 500, provision be made for the appointment of a worker safety representative to spend a proportionate amount of work time engaged in safety related activities.

that a worker safety representative hold office for a two-year term and work closely with the company's safety department.

that a worker safety representative be a member of the joint health and safety committee otherwise qualified to serve in this position, and that a worker safety representative not be permitted to hold any union office or to engage in partisan union political activity of any kind.

that a worker safety representative be paid the full amount he would have been paid had he continued in his classification.

that a worker safety representative report all workplace anomalies to first line supervision and to the safety department and that only in the event that the condition is not corrected to the satisfaction of the worker safety representative within a reasonable period of time should the matter be taken up with the joint health and safety committee.

that the existing provisions of the Act which allows the minister to grant exemptions also apply to the election or appointment of worker safety representatives.

Under the legislation, each worker is entitled to refuse to work where he has reason to believe that he is likely to endanger himself or another worker. In view of this right to refuse, we have not been convinced of the need to clothe the worker safety representative with the authority to shut down an operation.

The second factor which we have identified as impeding health and safety committees from achieving full potential as support

mechanisms for the direct responsibility system is the existence of an adversarial mentality. The effective utilization of these committees depends on the quality of the interaction between the individuals comprising the committee. As we have commented, to the extent that company and union representatives are unable to differentiate their day-to-day dealings in matters of health and safety from their other dealings, the effective operation of the health and safety committees will be impaired.

We have purposely distinguished the day-to-day handling of health and safety issues from the manner in which such issues are dealt with at the bargaining table. Under law, it is open to a union to press for contract provisions relating to health and safety in the adversarial climate which prevails at the bargaining table. While it would be preferable for a company and a union to conclude health and safety agreements apart from this adversarial climate, the Commission does not propose any constraint on a union's capability to push for improved health and safety contract provisions. However, it is quite another matter for a trade union to attempt to use the health and safety committees for other than consultation with respect to health and safety matters. If the tensions which exist in other facets of the labour-management relationship are allowed to carry over into the health and safety committee, or if the approach of either side is to press for an advantage or to prevent the other side from securing an advantage, effective communication and consultation will not take place in the day-to-day handling of health and safety matters.

It is the day-to-day attention to health and safety matters that the parties must divorce from the other aspects of the collective bargaining relationship. Day-to-day attention to health and safety matters must be approached as an integrative, rather

than as an adversarial, issue. While we sense that this separation has occurred within certain companies, we are not convinced that it has occurred to a sufficient degree within the industry generally.

If the individuals who serve on health and safety committees are involved in other facets of the union-management relationship, they will be predisposed to view matters in terms of advantage/disadvantage and will carry with them adversarial attitudes and adopt adversarial approaches. These postures are made all the more possible by the roles into which members of the committee are cast when the committee operates at the pragmatic level. If an adversarial mentality is brought to the health and safety committee by either side, it will breed a response in kind. In our view, it is essential that those who serve on these committees not be involved in other aspects of the union-management interface. In particular, union stewards, who frequently double as committeemen, and company personnel and labour relations officials should not be allowed to participate as members of joint health and safety committees. We recommend:

that membership on joint health and safety committees be restricted to workers not holding other union positions and to line supervisors or managers, and that workers acting as committee members not be permitted to engage in partisan union political activities.

The almost total lack of joint training of employer and worker representatives on joint health and safety committees is, in our view, another factor which contributes to an adversarial mentality and is impeding committee performance. For the most part, union representatives are trained by the union, and supervisors and company health and safety representatives are trained by the company. By failing to develop joint health and safety training programs, labour and management are missing a golden opportunity to build a solid foundation for

understanding. When joint training takes place, representatives of both sides receive the same message from the same source at the same time and interact with one another in an educational setting. The result is to blunt the forces otherwise pulling or pushing the participants towards an adversarial approach.

The Ontario mining industry is well structured to move into joint training of this type. There are only about 40 companies engaged in hard-rock mining in Ontario and these companies act together on a number of fronts through the Ontario Mining Association and the Mines Accident Prevention Association of Ontario. These companies have established their competence and expertise in the field of employee training. The United Steelworkers of America represent, by far, the majority of workers in the mining industry and has expressed support for the concept of joint safety training to this Commission. We have no reason to believe that the other unions representing mine workers in this province would be any less supportive. It is our hope that a revamped Mines Accident Prevention Association would equip itself to act as a catalyst in establishing joint health and safety training programs in the industry.

The Ontario government, through a Wintario grant, underwrites much of the cost of the Ontario Federation of Labour's Centre for Occupational Health and Safety. The centre provides education to union members in matters relating to occupational health and safety. Although the centre has voluntarily undertaken a joint training program covering union and management representatives in the retail food industry, there is no requirement upon it, as a condition of its funding, to engage in this type of activity. Given labour and management co-operation, the model being developed to serve the retail food industry could, with modifications if necessary, be applied to the Ontario mining industry. It is our view that a further impetus to the development of joint training programs could be achieved if future grants of government funds for health and safety

training were made conditional on a preparedness to develop these types of joint programs. We recommend:

that joint training for members of joint health and safety committees be undertaken and, where possible, supervisors also be involved.

that, in the absence of agreement to the contrary, the costs of such programs be charged back to the company or union on a per participant basis.

that the allocation of government monies to health and safety training be on condition that joint training be carried out wherever possible.

The third factor which we attribute to the failure of health and safety committees in the mining industry to achieve their full potential is management's reluctance to engage in open consultation on the full range of health and safety issues. Whether this reluctance is in reaction to the stance taken by local union representatives, whether it is a mistaken attempt to protect managerial prerogatives, or whether it simply stems from a lack of understanding of the committee's role, we can only speculate. Regardless, in our view, some managements have been content to allow health and safety committees to function at the pragmatic level and all too often it appears that union representatives have been willing partners in allowing this to happen.

Many of the matters which are appropriate for consultation are those which fall within the 'prerogative of managerial authority'. If full consultation is to take place, the primary onus is therefore on management to initiate and encourage the process. Failure in this regard undermines not only the health and safety committee, but the employer's whole safety program which is largely dependent upon worker acceptance and support. Management must not lose sight of this fundamental

fact. If worker entitlement to consultation is not met, legitimate expectations will be frustrated, management's commitment to maximize health and safety improvements will be put in issue and worker support for what is seen as an imposed program will be more difficult to achieve. While it may not be in management's self-interest to involve workers and their representatives in many areas of management decision-making, it is most certainly in management's self-interest to consult with workers and their representatives in respect of decisions affecting their health and safety.

If workers are not involved in the full range of consultations, they cannot be expected to understand the many trade-offs which must be made in allocating resources and to wholeheartedly support the decisions which are made. Just as it is essential for the union to make the distinction between the day-to-day administration of health and safety matters and the other facets of the union-management relationship, it is equally important for management to make this same distinction. We have spoken at length of the responsibilities which fall to the chief executive officer. It is incumbent upon the chief executive officer of each mining company to ensure that this distinction is understood throughout the organization and that the health and safety committees are used for consultation with workers on the full range of health and safety issues.

Joint health and safety committees should be used to:

- provide advice and insight from a health and safety perspective with respect to the adequacy of work rules and work practices;
- provide advice and insight from a health and safety perspective with respect to the planning of new or altered facilities, production processes and work methods;

- provide advice and insight from a health and safety perspective with respect to the purchase of production equipment;
- provide guidance with respect to the setting of safety goals and objectives for the organization as a whole and for appropriate sub-units;
- assess the effectiveness of the existing safety programs, including the use of supervisory contacts, workplace meetings, communications, safety incentives, etc., and to make appropriate recommendations;
- assess the effectiveness of the safety content of employee training and to make appropriate recommendations;
- analyse all injury and accident statistics as they pertain to both the organization as a whole and its sub-units, to identify trends and make appropriate recommendations;
- monitor the response of first line supervision to workplace anomalies and to make appropriate recommendations.

The above constitutes the full range of issues on which the joint health and safety committees should be consulted and involved. We, therefore, recommend:

that the chief executive officer and management of each mining company ensure that the joint health and safety committee is consulted on the full range of safety issues and that the documentation, data, materials and other information necessary for this purpose be made available to it.

The Commission gave serious consideration to the advisability of recommending that the joint health and safety committee also play a role in the resolution of grievances arising out of discipline imposed for alleged safety violations. Although it was not disputed before us that discipline may be a proper response to some safety violations, many of the unions appearing before the Commission complained bitterly that the imposition of discipline for safety related offences is often arbitrary and inconsistent. The union claim is that the result demoralizes the worker and diminishes the supervisor's credibility. Supervisors, in turn, consider union efforts on behalf of safety violators to be destructive of the safety program and feel themselves undermined when penalties are modified on appeal of the union.

On initial consideration it seemed to us that, if the joint committee were given the authority to deal with these matters failing resolution at the first step in the grievance procedure, a framework to circumvent many of the problems alluded to could be achieved. We gave serious consideration to recommending that the health and safety committee be given the authority to dispose of these grievances or refer them to arbitration. It was thought that the disposition by a committee sensitive to the need for consistency, sensitive to the need for an appropriate response to safety violations and whose singular commitment is to safety within the organization, would increase the likelihood of acceptability and, with it, the desired modification in the employee's future behavior, or the supervisor's future approach to discipline. In the final analysis, however, we decided that the risk of importing divisive pressures into the committee was too great. We would be naive to think that the health and safety committee would remain immune from the partisan pressures which arise in the handling of discipline cases. The better alternative, and one which is consistent with our recommendation that those otherwise engaged

in the union-management interface not be allowed to serve on health and safety committees, is that the health and safety committee, as one of its ongoing responsibilities, monitor the use of discipline as a tool in the achievement of safety objectives. We recommend:

that the joint health and safety committee monitor the use of discipline as a tool in the achievement of safety objectives and make appropriate recommendations.

The last factor, which we have identified as contributing to the failure of many health and safety committees to achieve full potential, is also a product of management attitude. In our view, these committees have not been accorded appropriate status. When we are told that the union co-chairman of a health and safety committee is not given adequate time off work to prepare his agenda and to make the necessary contacts, when we are told that the committee operates without an office, office equipment and typing facilities, when we are told that one major company has refused to pay bonus-miners serving on health and safety committees some approximation of bonus earnings while engaged in committee activities during working hours, then serious concerns are raised about management's understanding and support for the role of the joint health and safety committee. The reluctance to accord these committees status as valued support mechanisms indicates that some managements have neglected to make the necessary distinction between the day-to-day administration of health and safety matters and the other facets of the union-management interface.

The reluctance to pay bonus-miners an approximation of their bonus earnings while engaged in health and safety committee work is especially instructive. If a bonus-miner is not paid some

approximation of his bonus earnings while serving as a committee member, he will be required to suffer a financial hardship for time spent on committee activities (unless the difference is made up by his union). The result is to discourage qualified individuals who work in the areas where risk of accident and injury are proven to be the greatest. If a company takes the position that the union can make up the difference, or can attempt to win full reimbursement at the bargaining table, the status of the health and safety committee is seen as negotiable, thereby betraying either a lack of understanding or a disregard for the role of the committee. The committee structure supports the direct responsibility system. Therefore, it is in the company's self-interest to do what is necessary to ensure that qualified and competent employees are encouraged to serve.

Management has the necessary resources and authority to provide joint health and safety committee members with adequate time and facilities to carry out their role properly. We have recommended that one worker representative on the committee serve as a full-time worker safety representative and that he be given the time necessary to attend to the duties envisaged for him. In addition, it is incumbent upon the employer to provide the joint health and safety committee with a designated place suitable for the carrying out of committee work and for the storage of papers and documents relevant to the committee's undertakings. It is also incumbent upon the employer to provide the committee with assistance in the typing and reproduction of agendas, reports, memoranda, etc. If there is any question that employees should receive anything less than normal earnings, or some close approximation, the question must be resolved in favor of full reimbursement.

Having regard to the foregoing, we recommend:

that at least one of the worker members of the joint health and safety committee (preferably the full-time worker representative) be given sufficient time to prepare the worker portion of the committee agendas and to investigate and inquire into the matters which are before the committee.

that the worker members of the joint health and safety committee be provided with a private office (which may also double as the worker safety representative's office) equipped with adequate furniture and supplies and that typing and reproduction services be made available by the company.

Safety Department

We have discussed the difference between direct responsibility for worker safety and contributive, or support, responsibility. There is some evidence to suggest that the proper role of the safety department has not been fully understood by some companies and unions within the Ontario mining industry. Its function is not to assume responsibility for safety, but rather to support the direct responsibility system. This support manifests itself through the audit capability of the safety department on the one hand, and its assist capability on the other.⁹

We believe that it is essential for each company to maintain a staff section or department which possesses the resources and knowledge necessary to assist line management in its accident prevention efforts. This assistance may take the form of workplace inspections, follow-up programs designed to raise the skill and understanding of line management, programs designed to raise the level of safety consciousness and improve attitudes within the organization, analysis of the factors causing accidents, calculation of the cost of accidents and other related activities. The assist capability underscores management's commitment to safe production by providing line management with the specialized assistance it requires to maximize its safety performance.

We now turn to the audit function. We have discussed the role of the chief executive officer and the need for senior management to monitor safety performance and to hold all levels of line management accountable. If senior management is to fulfil its responsibilities in this regard, the audit capability of the safety department is of critical importance. If senior management is determined to monitor safety performance within the various sub-units of the line organization, it must have more information at its disposal than simply accident

⁹ The Commission has already noted that a full-fledged safety department may not be justified in a small mining operation. But it is essential that the staff safety function be covered off, regardless of the size of an operation, and it is this function which we are addressing rather than simply a department.

frequency statistics, which are unlikely to provide a full or accurate picture of total performance. Safety performance is built upon the maintenance of standard working practices and working conditions, planned accident prevention activities and a fostering of positive worker attitude. A well-functioning audit program will provide executive and senior management with information pertaining to:

- the safety-related programs and activities carried out by each sub-unit in the organization *vis-à-vis* established requirements;
- conditions of the workplace in each sub-unit *vis-à-vis* standard conditions;
- accident frequencies and other statistics *vis-à-vis* stated goals, both in absolute terms and on a comparative basis with the performance of other sub-units;
- worker attitudes within each sub-unit.

It is not sufficient that the safety department play only an inspection role. We draw a distinction between the safety audit and the safety inspection. The latter activity is primarily a tour of the workplace for the purpose of identifying unsatisfactory work practices and conditions of work at a given point in time. Its main purpose is to assist line management in identifying and correcting workplace anomalies. The audit, on the other hand, is an activity designed to evaluate performance in its broader aspects and over a longer period of time. Although the information gathered through inspections will contribute to the audit, so also will information gathered from employee and supervisor interviews, minutes of health and safety committee meetings, reports of government inspectors, accident investigation reports, accident statistics, etc. It is the audit which underpins senior management's ability to

monitor total safety performance within the organization and which establishes the safety department as providing an essential support service.

As a repository for specialized knowledge and skills, the safety department must assist line management in developing safety programs and improving safety performance. Equally important, however, the safety department must also audit the performance of line management. We see these two functions as compatible so long as the safety department has direct reporting access to the senior operating executives to whom the line organization is responsible. We recommend:

that in addition to assisting the line organization, the safety department within each company be made responsible for auditing the safety performance of the line organization.

that the manager of the safety department have direct reporting access to senior executives responsible for the line organization including the chief executive officer.

The safety department can, and should, be structured so as to play an integrative role between safety representatives of the worker, the supervisor, and management. Elsewhere we have recommended that safety representatives of the workers have a close working relationship with the company's safety department. Indeed, we have gone so far as to suggest that, where possible, safety representatives of the workers be involved in, and actually perform, some of the company's inspection function. During the course of our workshops with first line supervisors, a number advised that they had spent varying periods of time assigned to the safety department and had performed workplace inspections and follow-up. They benefited considerably from the experience. Those who had had the experience stated that they had become better supervisors because of it. Those who had not had the opportunity were of the opinion that

they could benefit from a tour of duty in the safety department. Consistent with the view that the safety department can, and should, be organized to integrate many of the functions which contribute to safety performance, and with our belief that first line supervisors can benefit from an assignment to the safety department, we recommend:

that first line supervisors receive the requisite training and carry out workplace safety inspections as part of a planned program of rotation of first line supervisors through the safety department.

Unions

We have observed that over 90 per cent of the workers in Ontario mines and mining plants are represented by trade unions. These trade unions represent workers in all matters relating to their terms and conditions of employment including health and safety and are empowered under *The Occupational Health and Safety Act, 1978* to appoint worker members to the joint health and safety committee. It follows that these trade unions are in a position to influence safety performance.

Although we must look first to the direct responsibility system, the strength of the local union's commitment to safety, as reflected in its priorities and in the approach which it takes to health and safety matters, has a direct bearing on the safety performance of those it represents. It is essential that the unions representing workers in the Ontario mining industry recognize this fact, just as it is essential that we scrutinize the trade union contribution to accident prevention in the industry.

It will not have escaped union attention that the two mines in the industry which consistently experience superior safety performance do not have union-represented employees. This fact strongly suggests that the adversarial climate which invariably accompanies most union-management relationships should be critically reassessed by unions when it comes to matters of health and safety.

In the issue document which we circulated prior to our public hearings, we asked the question 'What effect, if any, does the adversarial system of labour relations have on the ability of the parties to promote and maintain the safest possible workplace?' The Ontario Mining Association and a number of the companies appearing before us suggested that the adversarial system of labour relations is hindering safety performance. The Ontario Mining Association, citing the Ham report which maintains that there is no place for the adversarial system in dealing with health and safety, suggested in its initial submission that this Commission could make its greatest contribution to

the prevention of accidents by analysing the dynamics of adversarial relationships and their effects. The Ontario Mining Association asked 'What is the effect on safety committee efforts to reduce accidents when the bargaining committee recommends strike? Does the adversarial stance of one committee influence the other? What is the effect on management's side of the joint committee?' The legitimate concern of the Ontario Mining Association is that the process of free collective bargaining may be impeding the ability of the parties to work together in dealing with health and safety matters.

The preferred method of determining terms and conditions of employment in a free society is by means of free collective bargaining where employees choose to be represented by a union. In a free society, the right of workers to join together and choose a bargaining agent to represent them in their employment relations and to bargain on a more or less equal footing with their employer is recognized. The right to strike or lock out, although limited to certain prescribed times in the interests of economic stability (and withheld for certain public sector employees in the interests of the overall public good), reinforces the concept of equality and provides the mechanism to force accommodation where the interests of the parties are divergent. Although the process may lead to short-term economic disruptions from time to time, we have decided as a society that we are prepared to pay the price required to maintain basic freedoms (subject to the right of our elected representatives to intervene in any particular dispute). It should be noted as well, that the critics of the existing system have been unable to devise an alternative which better balances the interests of society, workers and management.

Because interests may vary on a number of subject matters, the free collective bargaining process carries with it the potential for adversarial conflict which may impact on the ability of the parties to approach health and safety matters in a spirit of

consultation and co-operation. Indeed we have seen this phenomenon at work. However, in addressing the issue, it is necessary to recognize the importance of free collective bargaining and to accept that the process will continue. The answer to the difficulties created by the carryover of adversarial approaches into safety matters lies in the structures designed to promote improved safety performance and in the maturity of the parties themselves.

In dealing with the impact of the adversarial mentality on the functioning of health and safety committees, we were careful to draw a distinction between the day-to-day approach to health and safety matters and the collective bargaining process. We accept that, as a last resort, health and safety proposals which have been carefully thought out and which reflect legitimate concerns may be appropriate matters for collective bargaining. We also accept that periods of union-management conflict will occur from time to time which will strain the relationship between the parties on all fronts. The challenge for the parties, therefore, is to develop the capability to deal with day-to-day health and safety concerns in a co-operative and consultative manner within the context of a free collective bargaining system. The representatives of both sides must recognize that strikes and other manifestations of periodic conflict will occur, but, at the same time, be able to maintain a consistent approach to health and safety matters.

The joint health and safety committee is the mechanism through which the parties can achieve this desired capability. A properly structured and functioning committee allows the parties to insulate the health and safety effort from the other more adversarial aspects of the relationship. In the face of our conclusion that an adversarial mentality is inhibiting the effectiveness of committees and preventing the parties from developing this capability, we have made a number of recommendations aimed at establishing a more viable committee structure.

Management must assume primary and direct responsibility for the health and safety of workers. We have discussed in detail the responsibilities which fall to the company in this regard. The local union as the bargaining agent of the workers whose safety is at stake has a critical contributive role to play. This is so not only because the local union is in a position to influence the attitudes and behaviour of its members, but, more importantly, because of the reactive dynamic of the union-management relationship. Union and management interact with each other on a number of fronts and, to a great extent, each side governs itself in the totality of the relationship by its perception of the policies and approaches which have been, or are likely to be, adopted by the other side. The implications for health and safety administration are two-fold. Firstly, the parties must approach health and safety as a separate and distinct area of union-management activity. As noted, we see the joint health and safety committee as the mechanism to allow the parties to segment health and safety from the other areas of the union-management relationship. Secondly, each party must exhibit a preparedness to deal with health and safety matters in a spirit of co-operation and consultation. It is imperative that each side be fully satisfied with the depth of the other's commitment.

What must the local union do to ensure that health and safety matters are dealt with in a spirit of co-operation and consultation? As a necessary first step, each local union within the Ontario mining industry must adopt and implement a policy which recognizes that day-to-day attention to health and safety matters is distinct and apart from the other aspects of the union-management relationship. Such a policy must commit the local union to a course of co-operation and consultation in health and safety matters wherever possible. We reluctantly add the proviso 'wherever possible' because a local union, as the representative of the worker, may be required, as a last resort, to respond to an habitually lax or inattentive employer

by adopting a posture which is counter to its policy of commitment and co-operation. We must make it perfectly clear, however, that the local unions appearing before us would be hard pressed to justify such a course in response to the level of attention now being given to health and safety by the respective companies. Although room for improvement exists, which will doubtless always be the case, we are satisfied that the companies are making genuine efforts which, in our view, warrant a co-operative union response.

Having taken the necessary policy initiative, the local union must follow through with its application. There are a number of obvious steps which can be taken by a local union in putting such a policy into practice. However, before dealing with these, we believe that each local union should undertake a comprehensive and honest review of the safety effort which is being made by the employer with a view, on the one hand, to reinforcing that effort whenever possible and, on the other, to identifying areas of concern which warrant discussion with management.

We have noted that the local union enjoys a significant measure of influence over its members. A local union committed to a co-operative approach to health and safety must be prepared to use its influence to reinforce the efforts being made by the company. This reinforcement may take place through internal union communications which describe the company effort in favourable terms, the local union's approach to safety violators, the manner in which it utilizes health and safety committees and the stance it takes on any given issue. Regardless, it is imperative that the union play a positive reinforcing role even where an individual issue may have been disposed of in a manner which is not altogether satisfactory to the union. An honest assessment of company efforts will allow the union to move more easily to a support role where the assessment warrants it.

If a local union fails to reinforce the company's safety effort where reinforcement is warranted or, worse still, if, for political or other reasons, it uses its influence to distort or undermine the company's efforts, it will be doing its member a grave disservice. For example, we are aware of two instances where local unions engaging in consultation with management on specific health and safety issues, reported the contents and progress of these consultations to the press in an attempt to embarrass the company and thereby force a resolution to their liking.

We have recommended that the worker members of the joint health and safety committee not hold other union appointments or offices and not be otherwise engaged in the union-management relationship. The purpose of our recommendation is to de-adversarialize and to depoliticize these committees as much as possible. If the local union is to play the positive role expected of it, it must embrace this recommendation. It must ensure that its appointments are on the basis of interest and qualifications and that its appointees are instructed to work in a co-operative manner in order to preserve the integrity of the committee. The union members of the joint health and safety committee must be allowed to operate without local union political interference.

We have commented that, in many instances, health and safety committees are operating in an adversarial mode where the primary union function appears to be to identify workplace anomalies and to push for resolution. We have made recommendations designed to alleviate this difficulty. However, where it does exist, the local union must share responsibility. It is incumbent upon the local union to recognize the first line supervisor as the initial contact within the direct responsibility system and to ensure that the focus for the resolution of individual complaints and concerns is directed away from the health and safety committee. Furthermore, the local union must not attempt to use the committee structure to deal with

complaints which are, at best, marginally related to safety. For example, one local union has used the health and safety committee to raise the issue of parking lot security and the failure of the company to provide block heater outlets in its parking lots. The local union attempted to justify its approach on the grounds that these are matters which concern the membership and, if allowed to preoccupy their thinking, might interfere with the safe performance of work. There are any number of other such issues which may be of concern to the membership. Presumably there are other consultative mechanisms to deal with such matters. If these types of issues are allowed to clutter committee agendas, the legitimate work of the health and safety committee will suffer. A local union which brings these kinds of issues to the health and safety committee has failed to grasp the proper role of the health and safety committee and has failed to make the necessary policy commitment. A local union which allows the committee to be misused in this manner is interfering with the consultative process necessary to the health and safety of its members.

We have recorded the complaints of many local unions with respect to the manner in which discipline is being imposed for safety violations. Likewise, we have recorded the concern of first line supervisors that the local union is undermining safety efforts by protecting unsafe workers. Because discipline may be used to enforce compliance with safe work standards and because the union may be expected to adopt an adversative stance in response, the potential for an adversarial confrontation in respect of a safety matter is created. Although we have recommended that the effectiveness of discipline as a tool in achieving safety objectives be evaluated, we acknowledge that there is a place for some form of industrial discipline in the enforcement of safe work practices. In many respects, therefore, the challenge facing the parties with respect to discipline for safety violators is similar to the broader challenge of dealing with health and safety within the confines of a collective bargaining relationship.

The parties must recognize that discipline, although an appropriate response to unsafe work practices in certain circumstances, carries with it the potential to thrust union and management into an adversarial conflict over a safety matter. We suspect that supervision may be relying on discipline to a greater extent than is necessary to maximize safety objectives and we would expect management to support the review which we have recommended be done by the joint health and safety committee. For its part, the local union must recognize that the unsafe worker is a danger to himself and to his fellow worker. Given a penalty which is in line with the severity of the offence and consistent with penalties imposed on others for similar offences, the local union is under no obligation to pursue the matter on behalf of the offender at the risk of eroding the co-operative approach to health and safety administration which benefits all of its members. We believe that each local union should review its practice with respect to responding to discipline for alleged safety-related offences. The membership should be advised that where the local union is satisfied that the offence has been committed, that the penalty is in line with the severity of the offence, that it is consistent with penalties imposed on others for similar offences, the offender will not receive the backing of his local union.

We have attempted to answer the concerns expressed by the Ontario Mining Association by stating our belief in the permanency of free collective bargaining and by acknowledging that, if health and safety administration is not insulated from the other facets of the adversarial relationship, health and safety efforts will be undermined.

The challenge for the parties has been defined. The steps which we believe must be undertaken by both management and local unions have been described. Our inquiries have convinced us that many local unions do not understand the nature of

the challenge or appreciate the extent to which they must support the safety system. Accordingly, we recommend:

that each local union representing workers in Ontario mines and mining plants review its approach to health and safety matters and take the steps necessary to commit itself to a course of union-management co-operation in health and safety administration.

The parent bodies of these local unions also have a key supportive role to play. The parent body, through its national or international representatives, advises the local union on many issues, suggests appropriate courses of action for the local union and provides considerable hands-on assistance in the running of the local union. Furthermore, in many instances, the parent body takes responsibility for the training of local union health and safety committee representatives and other local union officials. It would be naive to think that the necessary commitment of a local union to a policy of union-management co-operation in health and safety administration would be readily achieved without the wholehearted support of its parent body. We expect this support to be forthcoming.

Furthermore, a number of our specific recommendations and concerns will require the active co-operation of the local union and the support of the parent body. We refer specifically to those recommendations pertaining to the operation of health and safety committees, the use of group leaders, the discontinuance of the individual production bonus, the assignment of increased production responsibilities to union members, the response to alcohol and drug abuse in the workplace and the assessment of discipline as a tool in achieving accident prevention objectives. We expect co-operation from the local union and the active support of the parent body in these areas.

We have spoken of the need for labour to assume a meaningful role in the operation of the industry safety association. We

have recommended joint training of health and safety committeemen and have spoken in favour of continuing tripartite health and safety activities. The success or failure of these initiatives will depend in large measure on the maturity and co-operation of the parent labour bodies. Accordingly, we recommend:

that each parent labour body actively encourage and support union-management co-operation in health and safety matters at the local level and co-operate with the industry in those health and safety endeavours which require the direct involvement of the parent body.

Mines Accident Prevention Association of Ontario (MAPAO)

Section 119 of the Ontario *Workmen's Compensation Act* allows the employers within a class of employers to form themselves into an association for the purpose of education in accident prevention. If, in the opinion of the Workmen's Compensation Board, the association formed sufficiently represents the employers in the class, the Board may approve rules of operation which, if also approved by the Lieutenant-Governor in Council, are binding on all the employers in the class. The Board is further empowered to make a grant towards the expenses of any such association and the monies paid by the Board are charged against the class of employers represented by the association and levied as part of the assessment against the employers in such class. The officers and directors of an association are chosen from employers in the industries in which the association functions.

The directors of an association draw up an annual budget reflecting the anticipated operating expenses of the association and submit it to the Board. Where its operating expenses are within reason, *pro forma* approval is given and the employers in the class are each assessed a proportionate amount to cover the funding of the accident prevention association. To our knowledge, no funding request of any accident prevention association has ever been denied.

There are presently nine accident prevention associations operating in the province. The vast majority of Schedule I employers are members of one of these associations.

The mining companies operating in Ontario comprise a separate class of employers under the *Workmen's Compensation Act*. The Workmen's Compensation Board lists 587 companies in Class 5. However, if dormant companies and one-man operations are excluded, there are about 60 active mining companies within the class. These are the member companies of the Mines Accident Prevention Association of Ontario

(MAPAO) which is a safety association operating in accord with Section 119 of the *Workmen's Compensation Act*.

The MAPAO was incorporated in 1930. It is governed by a board of 13 directors and an executive committee of five. These directors and officers are volunteers from within the industry. The day-to-day activities of the association are managed by an executive director working out of a Toronto office which is shared with the Ontario Mining Association (OMA), the industry trade association. The executive director of the MAPAO performs the same role with the OMA so that, in effect, he is part-time to both organizations. In addition to the shared office space and the shared executive director, the assistant to the executive director, the secretary-treasurer and the head office support staff are shared with the OMA. This type of arrangement is atypical. With the exception of the Hospital Occupational Health and Safety Services, which functions as a department of the Ontario Hospital Association, we are not aware that any other safety association is linked with industry organizations through common personnel, facilities and services.

The MAPAO operates a field office located in North Bay which employs a staff of twenty professional, technical and clerical employees reporting to a field director. The association, through its field staff, conducts a variety of courses relating to occupational health and safety. In 1979, 2,000 individuals, primarily supervisory employees of the member companies, attended 124 courses. Sixty mine inspectors attended the association's course on 'Principles of Safety' and, in conjunction with the Ministry of Labour, the association has sponsored a seminar on rockbolting. In addition to the safety courses which are conducted at regular intervals, the MAPAO holds an annual conference lasting two and a half days at which a wide variety of technical papers are presented.

A major effort of the association is given to the collection of injury statistics. Every injury report submitted by member

companies to the Workmen's Compensation Board is sent to the association's field office where up-to-date comparative frequency records are maintained and made available to the industry.

The MAPAO prepares an annual report which, among other things, sets out the industry's safety performance for the year, publishes a monthly safety newsletter, and distributes a monthly injury statistics report and a monthly injury cost report which depicts compensation and medical aid costs for injuries. In addition, the association provides safety posters to its members, maintains a reference library and underwrites a series of television and radio health and safety messages which are aired in mining communities throughout the province.

In addition to the ongoing work of its staff, the MAPAO maintains three standing committees composed of volunteers from within the industry who are selected for their technical expertise and ability to contribute to the understanding of the industry. The safety committee monitors new developments and technology and recommends programs and priorities on the subject of occupational injury prevention. The occupational health and industrial hygiene committee considers matters of health and hygiene exclusive of respirable dusts. The ventilation and dust control committee focuses its attention on silicosis- and pneumoconiosis-producing agents and considers such matters as sampling technique, representational survey techniques and workplace ventilation. Each of these volunteer committees meets at least three times per year.

The MAPAO sponsors eight district safety groups and three district ventilation groups which meet regularly to discuss health and safety matters of local concern. A member of the association staff attends these meetings to advise on industry issues and provides a link with the other district groups, the standing committees and the association's offices.

The MAPAO addressed the Commission on its changing role and advised that it is currently considering three new initiatives. The association advised that it is studying the adoption of a system for auditing its members' safety programs which is being used by companies in the United States and South Africa. The system, known as the Five Star Safety Rating Program, provides the framework for an objective assessment of individual safety programs and for the rating of these companies on a predetermined scale. The association cautions, however, that 'this auditing function is a different thrust from our traditional role as educators and so we are trying to develop our own skills carefully and methodically.'

The second area of consideration concerns the place of organized labour in the MAPAO. The association advises that, in its opinion, the issue should be carefully reviewed because of the thrust of questions recently asked of it by the Ontario Minister of Labour's Advisory Council on Occupational Health and Occupational Safety and by this Commission. However, in its submission the MAPAO stated:

'Legally and traditionally the association is an employers' group. The financial resources come from the employer-members. The responsibility for safe working conditions and practices are and have always been assigned to the employer and we think it significant that the government, which had the opportunity to change this traditional responsibility when it passed *The Occupational Health and Safety Act, 1978*, did not choose to do so.

'Several examples of co-operation between labour and management can be mentioned; invariably these examples deal with definable problems and specific goals. When dealing with generalities, the problem of the traditional adversarial relationship and differing goals begins to intrude'

In response to suggestions that it would be strengthened by the addition of representatives of labour to its board of directors, the MAPAO suggested the formation of a joint consultative committee composed of members representing the MAPAO and members from a similar labour-based association.

The third area of endeavour now being considered by the MAPAO is increased research into causes of accidents. The association suggests that unfounded conclusions are being made with respect to the causes of accidents in the mining industry and, therefore, more thorough research is required. Specific reference is made to ground control, lighting levels, alcohol and drugs, competency of supervision, equipment design and the incentive bonus system. In respect of this last issue, the association stated:

‘Data supplied by the members of the association to the Commission do not seem to support the claims that have been made to the effect that a production bonus system causes accidents. However, the association believes that there is a lack of statistically reliable data and intends to look into an injury data reporting system that would help to resolve this issue.’

It is the intention of the MAPAO to improve its effectiveness by improving its research efforts.

Because the MAPAO is financed by means of workmen’s compensation levies against member companies and because it is dependent upon the volunteer efforts of individual company officials, the industry tends to view the MAPAO as a private organization. We sense that the failure of the industry to perceive the MAPAO as more than a company sponsored organization for accident prevention, has made the industry resentful of criticism directed towards the MAPAO, whether constructive or otherwise, and unduly protective of its undertakings. The failure of the MAPAO to involve labour in its

activities in any meaningful way underscores this attitude. So long as the association is seen as nothing more than a company-financed organization dependent upon the volunteer efforts of individuals paid by the mining companies for which they work, it will be difficult for the industry to accept that its performance should be measured against independent and objective standards or that its past efforts should be carefully reviewed.

The Occupational Health and Safety Act, 1978 and the *Workmen's Compensation Act*, are expressions of public policy in respect of worker safety, accident prevention and the compensation of injured workers. The legislation puts in place a system of responsibility for worker health and safety, a system of compensation for injured workers and the necessary support and auxiliary functions to ensure that these systems are responsive. Although framed in permissive terms, we view section 119 of the *Workmen's Compensation Act* as establishing education in accident prevention as one of these support functions. The majority of Schedule I companies in this province are members of one of the nine accident prevention associations and it has been recommended by the minister's advisory council that association coverage be expanded wherever possible. In any event, there can be no dispute that education in accident prevention must form a part of any comprehensive public policy designed to protect the safety of workers and compensate those who suffer injury at work.

The industry has failed to see the MAPAO as a vehicle for the carrying out of this broad public policy in the field of occupational health and safety. Indeed, the association is the preferred vehicle because it involves those who know the industry best and because it can reasonably be expected that initiatives and programs in the field of accident prevention developed within the industry will be more readily accepted and acted upon by that industry. Because it is a vehicle for the effectuation of public policy, however, neither the financial support nor the

executive control enjoyed by the industry serves to insulate the MAPAO from public scrutiny. Its performance must be measured against the objectives of the public policy it is designed to facilitate and, if found wanting, some alternative structure must be put in place. The public interest dictates this result.

The question of financing is at the heart of the misconception which exists in the industry with respect to the relationship between itself and the MAPAO. The belief that financial support entitles the industry to exclusive control over the programs and performance of the association is false. Administrative and executive control over the association is predicated upon the expectation that the industry can provide education in accident prevention more effectively than any feasible alternative. Regardless of the means chosen to provide the service, however, the industry must continue to pay the cost. In the first place, the industry is the direct beneficiary of the service and, as such, should be expected to assume the financial burden. More importantly, we view the levy charged for the operation of the association as part of the 'historic trade-off' which underpins the workmen's compensation system in Ontario. The basis of this trade-off is described by Professor Paul C. Weiler in his recently released report on *Reshaping Worker's Compensation for Ontario*. He described this trade-off in the following terms:

'Workers' compensation occupies an intermediate position between our two main legal models for reimbursing lost income: tort liability and social welfare. By contrast with the tort remedy—for motor vehicle accidents, for example—workers' compensation does not aim at full redress for all damages inflicted on the worker by his injury. But by contrast with the social welfare system (old age pensions, unemployment insurance, et al.), workers' compensation does aim to replace the bulk of the prior income lost by the injured claimant.

‘There is an explanation for this stance. Workers’ compensation embodies an historic trade-off. Employees in Ontario gave up the right to sue their employers in court and to collect full damages for all the losses they had received (including pain and suffering) if they could establish legal fault on the part of the employer. In return, employees were guaranteed protection against income losses due to industrial injuries, irrespective of fault.’

Although the MAPAO came into being as the result of a voluntary decision taken by a majority of the companies in the industry, it would be a mistake to look on a voluntary decision taken many years ago as in any way limiting the role and responsibility of the MAPAO in supporting current public policy objectives in the field of occupational safety. If it ever could have been said that the industry was not required to underwrite the cost of education in accident prevention as part of the bargain to insulate itself from civil suit, this limitation on the scope of the trade-off does not exist today. The employee continues to be deprived of a right which Professor Weiler correctly observes is worth a great deal more today than when the trade-off was imposed.

The current thrust of public policy, recognizing that an ounce of prevention is worth more than a pound of cure, is directed towards accident prevention. We have no hesitation in concluding, therefore, that in its contemporary context the trade-off carries with it a requirement on the employer to support sound and effective accident prevention education. The MAPAO, as a mature and self-regulating organization, is the preferred vehicle for providing education in accident prevention. However, if the association, as presently structured, fails to provide an adequate service, the industry is no less responsible for underwriting the cost of some alternative mechanism. In the final analysis, therefore, the industry must assume the financial burden for education in accident prevention. It should

appreciate that its control over the association is not dependent on its financial and other support, but on the effectiveness of the association measured against independent criteria.

We view the mandate of the MAPAO to provide education in accident prevention as extremely broad. Education is the process by which knowledge and understanding is imparted on one side and received on the other. Accordingly, any activity, program or contact which has the effect of improving employer understanding and commitment to accident prevention falls under the rubric of education in accident prevention. The scope for activity on the part of the association, therefore, is constrained only by the resources available to it and by the breadth of its imagination and ingenuity. When its mandate is viewed in this light, the vital role of the association is brought into focus. The association can reasonably be expected to engage in a wide range of programs and activities designed to raise the level of understanding and to motivate and facilitate an improved effort in the area of accident prevention. It is against this expectation that the performance of the MAPAO must be assessed.

We are satisfied that the MAPAO, as presently structured and directed, plays a useful and necessary function. It raises the level of safety consciousness within the industry and facilitates the safety efforts of its members by means of the courses it conducts, its statistical reports, its publications and support materials, the safety advertisements which it sponsors and the district infrastructure which it has established. Its committee structure serves to join the industry in common safety endeavours and to raise the technical competence and understanding of its member companies. The MAPAO is doing a credible job in the areas in which it is active. However, for whatever reason, the MAPAO has narrowly interpreted its mandate so that it has failed to analyse a number of pressing issues or to undertake a number of initiatives which would make it a more effective force in accident prevention.

The issues identified by the MAPAO as possible future areas for its involvement support our conclusion in this regard. Several difficult issues have been raised before the Commission, including the quality of first line supervision, the impact of alcohol and drug abuse, the margin of safety concept adopted by the industry safety leader, the use of discipline as a tool in achieving safety objectives, and the incentive bonus system. The MAPAO has neglected to undertake critical research in respect of these issues.

The association, although collecting and publishing accident statistics, does little follow-up and analytical work in order to identify the factors underlying accident trends. The on-site health and safety committee structure is a cornerstone of the legislative framework designed to improve occupational health and safety performance within the province. Apparently, the MAPAO has not made real effort to determine where the committee structure is working or not working and why. It is obvious to the Commission that there is a greater commitment to safety by some companies than by others and, further, that some management styles and practices are more conducive to good safety performance than others. To this point, the MAPAO has not undertaken any comparative analysis of its member companies in order to better understand the organizational arrangements and value systems which best provide for safety in the workplace. Its failure in this regard is especially disappointing in light of the superior safety performances enjoyed by such companies as Campbell Red Lake and Texas-gulf. In short, the activities of the MAPAO are not supported by the type of independent research one would expect from a body charged with educational responsibilities. The MAPAO has failed to identify and analyse the difficult managerial and behavioural impediments to the industry's safety performance and to create the environment and understanding necessary for honest re-evaluation.

We have expressed the view that the chief executive officer and senior management fulfil vital roles in accident prevention but it appears that MAPAO contacts at these levels are not emphasized. As noted, the Commission believes that what the MAPAO has undertaken, it does quite well. But, as also noted, we believe that its mandate has been unduly restricted by the industry itself and we have recited several important areas which fall within its mandate but have not been addressed.

The participation of organized labour in the work of the MAPAO and of the eight other safety associations, has been a contentious issue since at least 1950. The 1950 report on the *Workmen's Compensation Act* by Mr. Justice W. D. Roach was critical of the then existing system because it did not provide any means to ensure the active participation of labour in accident prevention. The 1960 report of the Royal Commission on Industrial Safety, chaired by Judge P.J. McAndrew, was similarly concerned, as was the Labour Safety Council of Ontario in its 1965 report on Accident Prevention and Safety Education in Ontario. This latter report called for the appointment of labour representatives to the boards of directors of the safety associations. More recently, the second Annual Report of the Ontario Advisory Council on Occupational Health and Occupational Safety, for the period April 1, 1979 to March 31, 1980, reviewed the status of labour *vis-à-vis* the accident prevention associations and recommended that, in the short-term, the associations take appropriate steps to establish management-labour advisory committees and, for the long-term, that the associations be encouraged to establish boards of directors with numbers drawn from employers and their organizations, workers and their organizations and the public. The advisory council reported that:

'When asked at the hearings before the council, no association could give an example of how the presence of labour would disrupt its activities. The existence and functioning of the liaison committees in some associations

illustrates how well management and labour can work together in this area without serious conflict.'

Likewise, we were not convinced by the MAPAO in its submission to this Commission that labour involvement would necessarily disrupt its activities. The role played by labour in developing the industry-wide modular training program and in developing the regulations which are now in place should allay any concern that labour would disrupt the activities of the organization. The advisory council sees the safety associations as 'the moral conscience of industry, labour and management' and cautions that the associations must not be seen as a tool of management 'but rather as a dynamic force independent of "partisan" interests and standing for excellence in occupational health and safety education.'

Over 90 per cent of production and maintenance workers in the Ontario mining industry are organized and most of these are represented by the United Steelworkers of America. The United Steelworkers asked the Commission to recommend the establishment of a separate workers' accident prevention association. Indeed the MAPAO is suggesting essentially the same thing with some type of formal co-ordination between the two organizations. Under questioning from the Commission, the representatives of the United Steelworkers' district office acknowledged that the union's first preference was to be allowed to participate in the policy and activity planning of the MAPAO. However, the MAPAO has failed to support labour or public participation on its board of directors and it appears that it is reluctant to involve labour or the public in its planning activities.

We visited the Construction Safety Association and the Industrial Accident Prevention Association, both of whom are faced with much more difficult structural problems in accommodating labour. However, both organizations have made efforts to involve labour at the working level. In particular, we were

impressed with the efforts of the Construction Safety Association. A joint council system operating at both the district and provincial levels is in operation in the construction industry and, through it, a number of joint safety accords have been developed between management and labour. These accords are statements of mutual agreement concerning work practices, training, hazard identification and elimination and safety equipment. It is very discouraging to think that an opportunity for joint involvement in the planning and delivery of education in accident prevention in the mining industry could be lost because of a fear that 'when dealing with generalities, the problem of the traditional adversarial relationship and differing goals begins to intrude.' The initiatives shown by at least some of the other associations support our contention that labour involvement at the association level would help to soften the adversarial mentality as it has interfered with safety efforts. We believe that the involvement of labour in the delivery of education in accident prevention will result in a more independent role for the association and, at the same time, will bring about broader based support for its activities. Public involvement would also prove beneficial in these areas.

Why has the MAPAO not been as effective a force in accident prevention as might reasonably have been expected? In our view, the difficulties facing the MAPAO stem from the size and homogeneity of the industry, coupled with the industry's perception of the MAPAO as its association. The mining industry is comprised of a relatively small number of active companies which are all engaged in the same basic activities, face common problems in many areas and interrelate with one another on many fronts. In these circumstances, the potential for policy to be influenced by industry interests rather than by broad safety considerations is present. If the industry considers the association to be an organization responsive to its interests rather than an independent force in accident prevention, the interests of the industry will prevail. The association, which is directed by representatives of the industry, will restrict

its vision and avoid confrontation or conflict with the industry. It is one thing for the Ontario Mining Association to defend the production bonus system as being best for the industry. It is quite another matter for the MAPAO, in the face of Texasgulf's safety performance where there is no production bonus, to take the same position without an exhaustive investigation. It is one thing for the industry to challenge labour and suggest that adversarial relationships are impeding safety efforts. It is another matter altogether for the MAPAO to adopt the identical view in structuring its mandate.

The stance taken by the MAPAO on these and other difficult issues illustrates its basic shortcoming. It is either unable or unwilling to play an independent role within the industry. The association must be prepared to assess the issues before it from a safety perspective, must not be inhibited by what it perceives to be the prevailing thought within the industry and must, where appropriate, be prepared to challenge the industry. As the entity responsible for accident prevention education within the industry, the MAPAO should play a role in identifying factors which may be inhibiting safety performance, and must be prepared to lay the ground work for re-assessment and re-evaluation where appropriate.

We have said that a self-regulating association is the preferred vehicle for education in accident prevention. We have concluded that the MAPAO is doing a credible job at the technical level. However, we have further concluded that the MAPAO has failed to become an independent force within the industry. The recommendations which follow are designed to preserve the best features of the existing arrangements and at the same time allow the association to overcome its basic shortcoming. If the association is unable to become an independent force for accident prevention within the industry, consideration must be given to increasing the role of government in the field of

education in accident prevention. It is our view that steps can be taken which will, at one and the same time, preserve the association concept, but allow it to function as an independent force.

Having regard to all of the foregoing, we recommend:

that the Mines Accident Prevention Association of Ontario sever its ties with the Ontario Mining Association, retain the services of a full-time executive director, establish its own offices separate and apart from the Ontario Mining Association offices, make provision for its own support staff and services, and continue to be financed by levies against its member companies.

that the Mines Accident Prevention Association of Ontario establish labour-management advisory committees at both the provincial and regional levels and that it move to include representatives of labour and the public on its board of directors.

Mining Health and Safety Branch

With the exception of uranium mining, the provincial government has jurisdiction over mining activities within provincial boundaries. It has been determined that all aspects of the nuclear cycle, including uranium mining, fall within federal jurisdiction by virtue of the peace, order and good government provision (section 91) of the *British North America Act*.

Within this assignment of jurisdiction, both the federal and Ontario governments have enacted legislation pertaining to health and safety in mines.

The Occupational Health and Safety Act, 1978 and *Ontario Regulations 660/79* provide the direct statutory base for the provincial role. Except for the provisions of the Ontario legislation relating to joint committees (section 8) and the right to refuse unsafe work (section 23), the federal legislation designed to cover uranium miners and plant workers is virtually identical to that which applies within provincial jurisdiction. This is so because the federal government referenced the Ontario occupational health and safety legislation as regulations under the *Canada Labour Code*. The federal code contains slightly different provisions in respect of joint committees and the refusal to work. Accordingly, the regulations to the code adopting the provincial statute are superseded by the language of the code itself. However, controversy has arisen with respect to the validity of the federal regulation, so that the extent of the statutory protection extended to uranium miners and plant workers is uncertain. We will address this issue under a separate heading.

The role of government is one of defining what minimum safety performance is acceptable and promoting compliance with the requirements established. Legislation is the basic instrument for carrying out this role. The Ham Report rested on the belief that employers and workers, operating within a system of direct internal responsibility, must be responsible for safety in the workplace. The concept, which we support, was not

challenged before us. *The Occupational Health and Safety Act, 1978* places primary responsibility for safety at work on employers and workers and defines the minimum standards which must be met. With the exception of the concern registered with respect to the adequacy of the worker inspection provisions of the statute, which we have addressed, there appears to be general contentment with the current legislative framework. It should also be noted that the removal of health and safety provisions from the *Mining Act*, which was accomplished with the enactment of *The Occupational Health and Safety Act, 1978*, was not seriously challenged.

In addition to keeping legislation relevant, the government's responsibility for promoting compliance with the objectives and procedures set out in the legislated framework is acknowledged. In December 1976, the Ontario government centralized its occupational health and safety activities into a division of the Ministry of Labour. This arrangement was recommended by the Ham Commission and brought together related services which had been located in three separate ministries. The purpose of the reorganization was to emphasize worker protection, facilitate closer contact between occupational health and safety programs and to promote administrative efficiency. The effect was to remove occupational health and safety responsibility for miners and mining plant workers from the Ministry of Natural Resources. There has been no real challenge to this reorganization before the Commission. The Occupational Health and Safety Division of the Ministry of Labour, which is headed by an assistant deputy minister, is responsible for policy development and, through its branches, for the promotion of statutory compliance.

The Mining Health and Safety Branch is the branch within the Occupational Health and Safety Division of the Ministry of Labour that is responsible for the government's safety activities in mines, mining plants, pits and quarries. The plants are those engaged in the primary processing of ore and are most

often located at a mine site. However, branch responsibility extends to the blast furnace operations of the major steel mills and to the transportation of metal bearing materials in the immediate vicinity of these furnaces. Our inquiry has been primarily directed to the adequacy of safety practices and arrangements at mines (as distinct from pits and quarries) and mining plants located at, or near, mine sites.

The Mining Health and Safety Branch maintains main offices in Toronto and Sudbury. In addition, there are eight field offices, eight mine rescue stations and a wire rope testing laboratory located in Toronto. The branch employs a staff of 94, (including 39 professional engineers) who are concentrated in the mining communities of Timmins, Kirkland Lake, Elliot Lake and Sudbury. The major programs of the Branch are:

- Compliance
- Wire Rope Testing
- Mine Rescue and
- Abandoned Mines

The compliance program is the most significant of these and the one with which we are directly concerned. It consists of the following elements:

- Inspection and Enforcement
- Accident Investigation
- Auditing the Work Environment
- Pre-development Review and
- Education

Inspection is carried out through on-site tours of a mine or mining plant by an inspector or engineer for the purpose of determining whether the workplace and the work practices therein comply with the Act and regulations. The branch attempts to cover each mine or mining plant at least three times a year by means of frequent inspections covering a small portion of the facility each time. This approach, which permits the branch to maintain more or less ongoing contact with each mine and mining plant within the province, is to be encouraged. Although there was some criticism that the frequency of inspection is too great, we are satisfied that the current target, given additional inspections directed at sub-standard performers, is reasonable. The branch attempts to secure compliance with the legislation through discussion during inspections and through the issuance of orders to correct unsatisfactory conditions or practices. In 1979-80, 8,344 such orders were issued, compared with 7,518 in 1978-79. In issuing orders, the inspector normally specifies the time in which he expects compliance to be achieved. It is estimated that in 98 per cent of these cases, the time requirements are met.

Under section 29(4) of the Act, if a contravention 'is a danger or hazard to the health and safety of a worker,' the inspector may issue an immediate stop work order. This will require the mine management to close down part, or all, of a mine or mining plant or to stop use of certain equipment or machinery until the danger or hazard has been corrected. The branch places substantial reliance on the stop work order as an enforcement measure and issued 40 such orders during the 12 months ending September 30, 1980. When serious or repeated violations occur, or a violation results in a fatal or serious accident, we are advised that the branch seeks advice from the ministry's legal staff on the appropriate course of action which may include prosecutions. There were nine prosecutions instituted in fiscal 1979-80 compared with twenty-seven in fiscal 1978-79.

In the past, the mines inspectorate has been accused by workers and their representatives of being too close to management. However, during our inquiry, it was the industry that was generally critical of the Mining Health and Safety Branch for adopting what is viewed as a confrontationalist and adversarial approach to maintaining compliance with the Act and regulations. The basis for this criticism stems from what is alleged to be an over-reliance on the issuance of orders, including stop work orders, and a preparedness to prosecute without considering all of the ramifications. We are satisfied that the industry's criticism, although sometimes strident, was not intended to suggest that there should be no positive enforcement of the law. Indeed, the representatives of the Ontario Mining Association acknowledged to the Commission that strict enforcement against the habitual or serious offender should be maintained. It appears to the Commission that the fundamental difficulty may be one of communication.

The industry's expectations have been shaped by a traditional relationship with the inspectorate marked by close co-operation and accommodation. The branch, for its part, while moving to a more active enforcement role, does not appear to have openly communicated its practices or policies with respect to enforcement. Nor does it appear that there has been sufficient dialogue with industry or worker representatives before branch practices or policies have been adopted.¹⁰ There is no rationale

¹⁰ As a recent example, the branch has arranged to have its inspectors trained at the Ontario Police College. In the absence of any prior dialogue with the industry or labour about the reason behind this initiative or the type of training to be received, it is not surprising that there has been considerable speculation about the direction the branch intends to follow in its enforcement activities. Company representatives, including those from companies with satisfactory safety performance who seek a co-operative relationship with the branch, are uncertain and concerned about the implications of police college training for mining inspectors. The course content includes introduction to law, the laws of evidence, notebooks and their use, the *Coroner's Act* and inquests, report writing, mockcourt, interviewing techniques, *Criminal Code* and its use, *Provincial Offences Act*. Clearly, the uncertainty and concern which has been precipitated by this initiative could have been avoided.

to support a decision by government not to advise industry and workers of its policies on the enforcement of occupational health and safety laws. Indeed, section 9(3) of the Act requires the branch to ensure that any person or organization concerned with the purpose of the Act is provided with information and advice pertaining to its administration. The industry and its workers are entitled to know, in broad terms, the practices and policies of the branch in this regard and to be informed of any new initiatives undertaken by the branch. This is especially so where compliance is achieved not only through enforcement, but also through co-operation and assistance and where these latter approaches have proven beneficial. While we support vigorous enforcement of the statute, especially in respect of operations judged to be substandard, we are critical of the branch for having failed to adequately communicate its enforcement policies.

We have been advised that the branch is in the process of introducing a management system which is intended to target its compliance-oriented work towards the most urgent safety problems. Its two components, identified as 'Engineering the Hazard Out' and 'Communication Hazard/Solution Awareness', focus on eliminating particularly serious physical hazards and unsafe work practices. Instead of giving all safety risks substantially the same priority, the branch intends to concentrate on identifying the more serious and overcoming these. We have also been advised that the branch has developed a system of ranking individual mining operations. We support the concept of concentrating the efforts of the branch at any given time on the more pronounced safety risks. We further support the concept of concentrating the efforts of the branch on those operations where safety performance has been judged substandard. We reiterate, however, that the direct participants are entitled to know the criteria against which they will be judged, to be told when performance has been judged substandard and to know the consequences which flow from substandard performance. The introduction of these programs

affords the branch an opportunity to develop an openness with the industry which is presently lacking. Having regard to the foregoing, we recommend:

that the mining Health and Safety Branch advise the industry and its workers in writing of its policies and practices with respect to the enforcement of the Act and regulations and apprise the industry and its workers of any changes to its policies and practices or the adoption of any new enforcement initiatives.

In addition to its inspection program, the branch is involved in the investigation of specific occurrences which are usually of a serious nature. Most investigations are into major accidents, fatalities, refusals to work and any other unusual occurrences that have safety implications. The branch staff attempts to determine the cause of the occurrence under investigation and identify the corrective action needed to prevent a recurrence.

The branch also promotes compliance with the Act and regulations by means of its pre-development review program. The branch staff reviews new equipment, processes, mine layouts and expansions to determine compatibility with statutory requirements. This is a consultative activity that allows the branch to work closely with the industry at the design stage. The program operates on the premise that, wherever feasible, potential hazards should be engineered out before workers are put at risk. We give full support to the involvement of the branch in this type of co-operative review activity. Although 54 projects were reviewed in the first six months of fiscal 1979-80 by the branch's Sudbury office, the branch is concerned that only major programs are coming forward for review. The branch intends to maintain closer contact in future with company engineering managers in order to promote the service. We encourage the industry to recognize that co-operative endeavors of this type can, and should, go hand in hand with

vigorous enforcement and to make full use of the engineering review service, seminars and courses offered by the branch.

In the introduction to this section, we stated that any system designed to minimize the risk of work-related accidents depends on the quality of the relationships between those who act within the system: workers, supervisors, management and union. It is the quality of these relationships which allows the participants to work together to minimize the risk of industrial accidents. In our view, the ultimate success or failure of a safety system will depend on the commitment of the individuals who work within it and on the quality of the relationships between them. *The Occupational Health and Safety Act, 1978* and its regulations, while dealing extensively with technical and engineering requirements, foster sound relationships by requiring openness between the participants and by establishing the committee structure as a vehicle through which the participants can interact. The importance of the human element has broad implications for the branch. We have not been satisfied from our inquiries that the branch has sufficiently understood or acted upon these implications.

The branch devotes itself almost entirely to ensuring compliance with the technical and engineering requirements of the law. The branch does very little to systematically monitor or influence the interpersonal behaviour which is so critical to maximizing safety performance. We have dealt, at length, with the importance of the chief executive officer, and we have made a number of recommendations designed to encourage government to reinforce the efforts of the committed chief executive officer and to motivate others to take a more active interest in worker safety. The decision of the branch to target its resources at those organizations judged to be substandard should assist in this regard.

The joint health and safety committee is designed to provide for collective worker participation in the safety system and

to allow the parties to a union/management relationship to deal with worker safety in an integrative, rather than an adversarial, mode. In our view, the joint health and safety committee provides a window through which to assess the quality of the relationship between company and worker, between union and worker, between company and union and between worker and supervisor. Section 8(7) of the Act requires a committee to maintain and keep minutes of its proceedings and to make them available for examination and review by an inspector.

We have discovered that the review of these minutes is given a low priority by the branch. Inspectors are not required to report on the workings of the joint health and safety committees within the operations they inspect. When asked if his inspectors review health and safety committee minutes, the director of the branch replied that he hoped so. There does not appear to be any planned program of branch observance of health and safety committee activity. Although the quality of the essential relationships cannot be quantified in engineering terms, there are a number of behavioural or attitudinal *indicia* which may point to breakdowns. By failing to monitor the performance of the joint health and safety committees adequately, the branch is missing the opportunity to pinpoint potential substandard situations before they are revealed by visual inspection of the workplace or accident statistics.

If the branch is to play the role of facilitator and act as a resource for the direct responsibility system, it must develop the capability of identifying and responding to relationship breakdowns. The identification of human relations difficulties will fall to the inspection staff who are in direct personal contact with the various mining operations. The Industrial Health and Safety Branch—another branch in the ministry's Occupational Health and Safety Division—has developed an inspection procedure designed to assess the attentiveness of the internal participants.

We are of the view that this procedure has considerable merit and can be applied within the mining industry.

The industrial safety inspector is required to hold a joint interview with a worker representative, usually a member of the joint health and safety committee, and an employer representative before commencing a visual inspection of the workplace. Each representative is asked to list the 'unresolved health and safety concerns' which exist in the area to be inspected and to record when each concern first arose, when management was informed and what action is planned or has been taken. The representatives accompany the inspector on his visual inspection. The inspector looks into each unresolved concern and issues orders where appropriate. Upon completion of the inspection, the inspector reviews the current situation with the two representatives and compares the results of their self-assessment (in the form of unresolved concerns) with what was actually discovered during the inspection. The advantage of this approach is that the representatives are required to be attentive and constructive in anticipation of an inspection.

We suggest, as well, that the inspector review, in the presence of the two representatives, the minutes of the health and safety committee meetings which have occurred since the last inspection. Having compared the results of his inspection with the prior self-assessment of the representatives, and having reviewed the health and safety committee minutes, the inspector will be in a position to assess and report to his supervisor on the performance of the direct and contributive responsibility systems within the facility he has inspected. We recommend:

that the branch inspector meet with a worker representative and employer representative before commencing a workplace inspection and that these representatives be required to identify, in the manner described, all unresolved health and safety concerns.

that the branch inspector meet with these worker and employer representatives after the workplace inspection to review their previously identified concerns in light of the results of the inspection.

that the branch inspector review, in the presence of the representatives, the minutes of the health and safety committee meetings which have occurred since the previous inspection.

that following each inspection, the branch inspector be required to file with his supervisor a written report on the performance of the responsibility systems at the particular operation.

that branch inspectors be given the training necessary to carry out these responsibilities.

The primary purpose of these recommendations is to allow the branch to identify those situations in which the relationships necessary to support both the direct and contributive responsibility systems have broken down.

Having organized itself to monitor and identify attitudinal and behavioural difficulties, the branch must achieve the capability of responding. As we have noted, the branch devotes the bulk of its resources to ensuring compliance with the technical and engineering requirements of the law. Its emphasis in this regard is underscored by the fact that over 40 per cent of its staff are professional engineers. However, the skills required to deal with behavioural and interpersonal breakdowns are not necessarily the same as those required to support the branch's other activities.

The Occupational Health and Safety Division of the ministry—the division to which the Mining Health and Safety Branch reports—

has recently acquired from the ministry's Industrial Relations Division, the services of a professional mediator who is skilled in preventative mediation techniques, that is, providing assistance to parties whose ongoing relationship has deteriorated. We are advised that he has acted with some success following a breakdown in co-operative health and safety activity at a major steel-producing facility. These services, which the division has acquired, are essential to the facilitative role which it and its branches are expected to play. In the longer term, however, these services must be transferred to the branch so that it can respond at the initial sign of a breakdown. We believe that the branch itself must acquire the capability of identifying and responding to relationship breakdowns.

We have discussed the role of the inspector in assessing these relationships. It follows that the branch must develop the capability of involving itself where unsatisfactory relationships have been identified as impeding health and safety performance. This involvement may take any number of forms, counselling, for example, or a full-blown 'Relationship by Objectives' program patterned after the one implemented successfully by the ministry's Industrial Relations Division. In any event, the branch responsible for fostering compliance with the intent and objectives of a law that requires management, supervisors, workers and their representatives to work together to provide for the safety of workers, must have the capability of responding where the relationships between the participants deteriorate. We recommend:

that the Mining Health and Safety Branch develop the capability of responding to relationship difficulties that are impeding health and safety performance.

The branch currently employs 39 professional engineers and 25 inspectors. The inspectors spend their time primarily engaged in workplace inspections and surveys. Workplace inspections

are also carried out by professional engineers. In fiscal 1979-80, professional engineers spent 24 per cent of their working time on inspections. In addition, they perform the bulk of the pre-development review and investigation work. The broad discretionary powers previously held by a mining inspector have been curtailed significantly so that the person performing routine workplace inspections no longer requires professional engineering qualifications. An inspector's primary role is to determine if the defined standards are being met. This change suggests that the vast majority of routine workplace inspections can be carried out exclusively by inspectors.

We have suggested that the industry make greater use of the pre-development review service offered by the branch, that the branch consult with managers of those operations judged to be substandard and that the branch play a more significant educative role. In addition, we believe that the branch should develop the capability of formally responding to significant relationship and behavioural deviations. If the initiatives that we have proposed are to be carried out and if the branch is to realize the full potential of its professional staff, a clearer demarcation between the functions of inspectors and professional engineers will be required and there will have to be a shift in emphasis in the engineer's function. Furthermore, these proposed initiatives may also require the branch to hire persons at the senior level who, although not professional engineers, are qualified to act in a mediative and consultative capacity. We recommend:

that the future recruitment of branch inspectors be based in part upon interpersonal skills and that, in addition to their present duties, inspectors be assigned on-site monitoring of the direct and contributive responsibility systems at the workplace.

that, wherever possible, branch engineers be relieved of workplace inspection and be assigned responsibility for investigation, pre-development review, consultation, educational activity and response to responsibility system breakdowns.

that the future recruitment of branch engineers be based in part upon interpersonal skills and the potential to act in a mediative mode, and that the training and development of branch engineers include these aspects.

In the broader context, government acknowledges its responsibility to keep the legislative framework relevant and current. In this regard, a tripartite committee operates to review the regulations. The government is to be commended for the manner in which it has chosen to up-date the mining regulations. It was suggested to the Commission that the recommendations made by coroners' juries investigating mining fatalities be studied for possible general application within the industry. There is presently no mechanism for accomplishing this task. Accordingly, we recommend:

that the tripartite committee responsible for reviewing the mining regulations study all recommendations made by coroners' juries investigating mining fatalities for possible general application and make appropriate recommendations.

Other Issues

Ground Control

Over 15 per cent of the underground fatalities that have occurred in Ontario mines since 1975 have been attributed to fall of ground. Four of the 15 underground fatalities (22 per cent) which occurred in 1980 were a result of fall of ground. Historically, fall of ground has been the cause of about 7.5 per cent of all underground lost time accidents in Ontario mines. It is a major cause of fatalities and lost time accidents within the industry. The Commission therefore identified ground control as an issue to be addressed before it.¹¹

A fall of ground may result from a fall of rock (called 'loose') which has not been removed from the underground roof or walls after blasting or from it having been improperly supported; or it may be caused by a structural fault which causes larger pieces of rock to give way under pressure. Each type of potential failure requires its own preventive techniques. Prevention of accidents from fall of loose centres on its removal before it falls and on the use of equipment designed to protect the miner. The prevention of accidents from structural collapse centres on the design of the mine, visual and mechanical monitoring, and stabilization of the rock mass.

The identification and removal of loose pieces of rock from the roof of the working area is done by means of scaling. Scaling is the process by which the miner, proceeding from good ground to bad, strikes the rock mass overhead with an iron bar. Solid rock causes the bar to give off a ringing response when it is impacted. A dull response indicates loose and, as

¹¹ The Commission retained Professor Peter Calder, Head, Department of Mining Engineering, Queen's University, as a consultant in this area. Dr. Calder holds a Ph.D. in mining engineering, has a specialists' designation in mining-Rock Mechanics, APEO. He is chairman-Canadian Advisory Committee on Rock Mechanics' Underground Blasting Sub-committee. The Commission's letter to Dr. Calder asking for his views on certain issues identified to the Commission, and his report to the Commission are reproduced in Volume II of the Commission's Report.

a result, is accompanied by a muffled sound or echo. The pieces of loose rock are then dislodged with the scaling bar and allowed to fall to the floor. The process, although it appears primitive, is extremely effective if done systematically and conscientiously. Scaling is carried out in all Ontario mines as part of the ongoing mining sequence.

Our concern in this area is not with the scaling procedures themselves, but with the lack of a proper visual follow-up. It is our view that routine visual inspections of each work area and travelway should be carried out by specially trained and designated persons under well-lit conditions. The purpose of these inspections is to observe and report loose rock conditions and to monitor and report on potential structural defects. We will deal more fully with this concept later in this section.

The second way in which miners are protected from the fall of loose is by means of protective equipment. Hard hats, which are worn by all underground miners, are an example of protective equipment designed to protect a worker from falling objects. However, hard hats are often inadequate protection against falling loose because even relatively small pieces may weigh upwards of 100 pounds. As the mining process becomes more mechanized and more and more miners work from a single piece of equipment, whether scoop tram or drill rig, it seems reasonable that this equipment should be outfitted with overhead protection wherever practicable. Much to our surprise, the industry has not moved in this area. Very little of the man-operated underground equipment in use in the industry today is outfitted with fall-on protection. In the face of a serious safety concern and in the absence of a convincing explanation of why this type of protective equipment is not in widespread use, we recommend:

that wherever practical, fall-on protection be installed on all man-operated underground equipment.

The prevention of rock falls caused by structural faults and other geological phenomena rests with mine design, visual and mechanical monitoring of the rock mass and the stabilization of the rock mass by removing loose rock from the solid rock or by securing it, using artificial reinforcement. The first two of these preventative approaches require specialized knowledge and training at both the professional and the technical levels.

We are advised that, although the universities have adequate staff and facilities, there is an acute shortage, in Canada, of graduate mining engineers with a specialty in rock mechanics. The knowledge brought to bear by a graduate rock mechanics engineer is essential to both the proper design and planning of a mine or mine expansion and to the implementation of a ground control program. Although consultants are often used to good advantage in this regard, it is the view of the Commission that each mining company should have on staff a resident rock mechanics engineer who has been trained at the graduate level and who has a good working knowledge of that company's operations. We recommend:

that each mining company operating in Ontario employ at least one professional engineer with post-graduate qualification in rock mechanics and that a person holding such qualification be used in the design and planning of a mine or mine expansion and that a person holding such qualification be made responsible for the company's ground control program.

We have noted that certain universities presently have adequate staff and facilities to produce post-graduate mining engineers with a specialty in rock mechanics. The time required for a mining engineer to complete a post-graduate program in rock mechanics is approximately eight months of full-time attendance at a university with an additional four months required to complete a thesis. The mining industry, when faced with skilled labour shortages at the working level, has responded by

instituting elaborate and effective training programs. The industry is presently faced with a shortage of qualified rock mechanics engineers and must now move to rectify the situation.

In our view, Ontario mining companies can best address this problem by undertaking to encourage, for post-graduate qualification, engineers who have been identified as having high potential and an interest in the field. The thesis undertaken by a company-sponsored student could be in an area of special interest to that company. This approach would overcome the shortfall in a very short period of time.

The shortfall, in the specialized training and knowledge required to maximize ground control efforts, whether through design and planning or the visual and mechanical monitoring of the rock mass, is as severe at the working or technical level as it is at the professional level. If ground control efforts are to be effective, it is imperative that those with responsibility for visual and other monitoring have a basic understanding of rock mechanics. We refer specifically to first line supervisors, group leaders and geologists. Similarly, it is imperative that rock mechanic technicians be available to assist the rock mechanics engineer with design work and to maintain the mechanical monitoring capability.

We are aware that the Mining Health and Safety Branch, in conjunction with the Mines Accident Prevention Association of Ontario, has conducted seminars on the topic of rock mechanics. These seminars no doubt provide a useful overview for mining personnel interested in the subject. The branch and the association are to be applauded for their efforts in this regard. However, what is required is a more comprehensive course of study designed to qualify the non-professional as a technician knowledgeable in the theory and practice of ground control. All underground supervisors should be so qualified and

we have recommended that a ground control module be incorporated into the modular training program for first line supervisors. We recommend;

*that a committee of the Mines Accident Prevention Association of Ontario be struck to design a course of study in ground control to be offered through appropriate community colleges of Applied Arts and Technology.*¹²

Once the necessary expertise is in place, the influence of ground control theory on mine design and mining practice and in the development of mechanical ground monitoring devices will be more widely and consistently felt throughout the industry. We are advised that there are currently a number of devices and mechanical procedures which can be used to identify stress conditions and rock fractures and also to record movement in the rock mass.¹³ These devices are useful in given situations but, as yet, are unsuitable for general use. Additional research and experimentation is required in order to further develop these, and other techniques and to make them more reliable. We are not in a position to recommend additional use of any of these devices or procedures. However, we expect that the industry will ensure adequate support for the efforts of the research institutions (CANMET, MIROC) and the universities in this critical area.

Visual inspection is an essential component of any sound ground control system. Indeed, the visual inspection of all active working areas supports all other ground control activities in

¹² A draft outline of such a course is contained in the paper prepared for the commission by Professor Calder.

¹³ These are identified in the paper prepared by Professor Calder for the Commission which is reproduced in Volume II of this Report.

that it is the most effective way of observing conditions over a wide area. There are three prerequisites to an effective visual inspection program

- The person inspecting must have a knowledge of basic geology, an understanding of typical rock stress conditions in underground mines, a knowledge of various mining methods with particular emphasis on ground control implications, and an awareness of the various types of ground support systems.
- The person inspecting must be accountable for the quality of the inspection.
- The inspection must be conducted under conditions which permit an unimpeded visual observation of the workplace, that is, with an auxiliary source of high intensity light.

Ground control inspection programs which exhibit these prerequisites are not the general rule in the Ontario mining industry. In many cases, the inspection is not done on a systematic basis, or by a person with the required knowledge, or by a person who is held accountable; nor is it done under suitable conditions. It appears that each miner and supervisor is required to observe ground conditions, as they should, but with no specific accountability and without the required knowledge.

In the more highly mechanized mines, many miners work from pieces of moving equipment and spend less time in each individual work area than has previously been the case. In the result, many such miners are less familiar with the surrounding rock than they would otherwise be. As the industry becomes more and more mechanized, the need for a systematic and formalized visual inspection program increases. We note that Rio Algom utilizes its geologists in this role and, in so doing,

comes close to meeting the necessary requirements. Having regard to the foregoing, we recommend;

that a planned and systematic program of visual inspection of each active work area be conducted in each mine.

that the inspections be carried out by persons who have specialized knowledge in rock mechanics.

that these inspections be carried out under an auxiliary source of high intensity lighting.

that the persons making these inspections be required to file regular written reports with the supervisor of the inspection program.

Adequate lighting is required if a program of visual inspection is to be effective. The advantage of good lighting was driven home to the Commission when it toured the Denison mine and was taken into a stope where three miners had been killed by a massive rockfall a short time before. An auxiliary source of light had been connected and this was turned on as we entered the stope, illuminating the stope and allowing for an excellent visual examination of the work area. In carrying out visual ground inspection, there is a need for a hand-held, high intensity source of light. We are advised that such a light source is readily available. The Mining Industry Research Organization of Canada (MIROC) has developed a 12-volt ten-cell nickle cadmium battery pack which can be used with commercially available, high intensity 12-volt spot lights.

Our final comments on the issue of ground control are directed to the need to apprise miners of the specific ground conditions in which they are working. The miner should know the structural characteristics of the rock mass, the projected difficulties that

have been identified and the signs that might reveal weakness in the rock in which he is working. He should be advised of these conditions in a systematic and formalized manner. This is not generally the case in the Ontario mining industry and accordingly, we recommend:

that work crews be formally and systematically made aware of ground conditions in the areas in which they are working.

Lighting

The battery operated cap lamp worn by underground miners provides the primary source of light at workplaces in Ontario mines. Where mechanized equipment is in use, the headlights from this equipment serve as an additional source of light. Because individual work areas in a mine are so spread out, both vertically and laterally, because blasting is an integral part of the mining process and because workplaces are constantly changing location, it has been deemed impractical to use other than the light sources we have referred to. The cap lamp gives little peripheral lighting and results in a tunnel vision effect; in addition, it produces glare problems. The poor natural reflectivity from underground surfaces and the loss of transmitted light because of fog or dust reduces what small amount of light is available.¹⁴ It is not surprising, given that sight is our most important sense, that the inadequacy of lighting in underground work areas was raised as an issue before the Commission.

A number of local unions argued that lack of proper underground lighting reduces, by a large percentage, the employee's ability to practise self-preservation and safety. It was argued that only when miners can make full use of their eyesight will accident prevention be maximized. On the other side, we were told of the difficulties of installing permanent lighting at underground workplaces and, further, that additional lighting may create as many safety problems as it solves. Specific reference was made to the creation of shadows and to a lessening of the ability of equipment operators and others to identify the miner on foot by the light from his cap lamp.

We are not aware of any comprehensive and independent empirical research done in the area of mine lighting in Canadian metal mines. Individual companies have experimented from time to time, but these efforts have not been co-ordinated

¹⁴ See: Trotter, D., 'Mine Lighting', *Canadian Mining Journal*, July 1977, page 24.

or directed toward the objective of determining optimum lighting conditions for given types of work areas. However, general research into the correlation of accidents and lighting levels supports the conclusion that improved lighting of underground work areas would reduce the risk of accidents.¹⁵

This research includes studies which show that highway accidents decrease with improved lighting (Ketvirtis, A., *Highway Lighting Engineering*, Foundation of Canada, Engineering Corporation Limited, Toronto, 1967). A similar relationship between accidents and lighting has been found to exist in factories (Grandjean, E. *Fitting the Task to the Man—An Ergonomic Approach*, Taylor and Francis Ltd., 1969.) Studies also show that fatalities of older miners, whose visual capabilities have deteriorated with age, increase considerably in spite of the fact that many of the older workers are employed in relatively safer jobs. On surface, where visibility is better, this correlation does not exist. (Roberts, A., *Underground Lighting in Mines, Shafts and Tunnels*, London, The Technical Press Ltd., 1958). After artificial lighting had been installed in one section of an Hungarian lignite mine, the accident rate of that section decreased by 60 per cent. (Hallos, K.K., *Influence of Lighting on Productivity and Safety in Mines* (German) Freiburger, Forschungslefte, A 439, 69, 1968).

We have little doubt that the lack of proper lighting in underground work areas contributes to accidents. The difficulty facing this Commission, and indeed any mine owner who might wish to consider improved lighting, is the lack of knowledge with respect to optimum levels of lighting and the identification of systems which could be easily adapted to the underground environment. In addition, there is an absence of hard data on the benefits which might be expected: productivity,

¹⁵ These studies are referred to in a soon to be published book by Donald Trotter, Associate Professor of Mining Engineering, McGill University, 'The Lighting of Underground Mines' TransTech Publications, Clausthal, Fed. Republic of Germany.

reduced equipment repairs, lower turnover, reduced absenteeism, etc., including a reduction in accidents. The lack of knowledge in these important areas suggests that a co-ordinated and comprehensive research effort is required.

Most accidents are caused by several factors, some more instrumental than others in any given case. These factors may relate to the physical or mental state of the victim: fatigue, worry, after effects of intoxication, frustration, etc., or to the work environment: heat, noise, dust, light, etc., or to the object which causes the accident: scoop tram, drill, etc. We have devoted a section of our report to the data base. We find that the data base, as it relates to the collection and analysis of data pertaining to the causes of accidents, is inadequate. Nowhere is this more apparent than in the effect of inadequate lighting. The absence of light sources other than those referred to: cap lamp and vehicle headlights, dulls the individual's sense of awareness and impairs his reaction time. However, because lighting conditions are the same in most underground work areas, lighting is not often identified as a specific contributive cause of accidents. We are of the view that lighting should be investigated as a possible cause of all reportable underground accidents¹⁶ and that appropriate reporting be required. In all cases of serious accidents, photometric values should be recorded by persons trained in the use of photometric equipment. We recommend:

that inadequate lighting be investigated as a possible cause of all reportable underground accidents and that in all cases of serious underground accidents, photometric values be recorded by persons trained in the use of photometric equipment.

¹⁶ Reportable accidents are those which must be reported, with proper causal data, to the body charged with maintaining the data base (See the section of this Report headed 'Data Base').

In addition to the improved reporting of accidents in accord with the above recommendation, it is our view that empirical research is needed. The research effort, which will require the active support and co-operation of the industry, must:

- determine the optimum level of lighting needed for different types of underground work areas.
- identify types of lighting systems which will provide the required light and, at the same time, be of practical use in a mining environment.
- quantify the measurable effects of improved lighting, i.e. productivity, equipment damage, absenteeism, turnover, accidents, etc.

While there can be little argument that improved underground lighting would result in better safety performance, the uncertainty surrounding the best way to proceed and the lack of information about the cost-benefits associated with making improvements has impeded voluntary action on the part of the individual mining companies. Accordingly, we recommend:

that the Mines Accident Prevention Association of Ontario, in conjunction with the industry, undertake a comprehensive research program to satisfy the needs which have been identified.

that an independent authority in the field of mine lighting be retained to direct and co-ordinate the research effort.

Worker Training

We have dealt with supervisory training and the training of health and safety committeemen elsewhere in our Report. This section deals with job-related training given to workers to enable them to perform their jobs safely and productively.

During the course of his inquiry, Dr. Ham found a wide variation in the content of, and emphasis upon, worker training within the Ontario mining industry. He concluded that the quality of job training in the industry was lacking and recommended 'that the industry, government, and labour give high priority to the development, standardization, and accreditation of modular training and qualification for workers in mines and mine plants.' An industry reassessment of its efforts in this regard had been undertaken coincidental with the Ham Inquiry which resulted in a recommendation by the Ontario Mining Association to the Ham Commission that a type of modular training then being used by Falconbridge Nickel Mines be applied throughout the industry. The modular approach to training involves breaking down and identifying the various skills required for a job and establishing standards of performance which must be attained before competency is recognized. An individual module is a concise description of what a person has to know, or be able to do, to accomplish a specific task in an efficient, productive and safe way.¹⁷

Even before the Ham Commission had reported, the Ministry of Colleges and Universities established a tripartite task force to consider the feasibility of developing this type of modular training program for the Ontario mining industry. The task force has since completed a section called 'The Common Core for Basic Underground Hard Rock Mining Skills' covering seven basic mining skills used in all hard rock mining situations in Ontario. These basic skills are: general inspection, scaling, staging, drilling, rock bolting, blasting and mucking. The tripartite committee is presently putting the finishing touches to a

¹⁷ See Buckland, G.R. 'Modular Training in Ontario Mining—An Overview' *CIM Bulletin*, Volume 73, No. 284, December 1980

second program for developing underground skills beyond the basic common core. The more advanced program, 'Specialized Underground Hard Rock Mining Skills', will also have seven components: production, development, haulage, drilling, general services, shaft services and construction services.

The decision to implement modular training for underground miners on an industry-wide basis, now incorporated as a requirement under the mining regulations, brought with it a major commitment of personnel and financial resources by every mining company. Each company was required to identify and document the training materials required and to tailor approaches that would be appropriate to its operations. INCO, for example, informed us that over a period of 18 months, 30 of its staff wrote approximately 1,100 training segments required for its common core program. The effort was industry-wide and co-operative in the sense that several of the larger firms assisted many of the smaller ones with the implementation of the program.

Currently there are approximately 7,000 employees participating in modular training. Based on information provided during the hearings, we estimate that almost 50 per cent of the industry's approximately 17,000 underground workers have completed the common core program. We consider the decline in accident frequencies experienced by young and inexperienced miners in the two-year period since implementation of the program to be a positive reflection of the industry's effort in this regard. Accidents sustained by young and inexperienced miners have been reduced by about 21 per cent since the inception of the common core modular training program.

For the most part, the unions appearing before us acknowledged this improvement. While union submissions to the Ham Commission were highly critical of company training programs, they

are now generally supportive of company efforts. Local 6500 of the United Steelworkers of America stated in its brief to us, 'The training given to new employees, particularly in the mining area, has much improved over what was given to the new employee in the past. . . . The quality of training has been upgraded to the point where employees taking the training are confident they can do the job much better than before.'

It is clear that the industry is presently in a transition period insofar as worker training is concerned. The industry has moved from a variety of programs which recognized shortcomings to a program which is significantly better and which has exceptional promise. We are confident that the implementation of the more advanced modular program for underground miners will prove to be as beneficial as the common core program has been.

We are informed that modular training concepts are now being introduced into some surface operations. But this type of training is not required by regulation and, given the efforts currently directed towards training for underground work, it is not surprising that there is no widespread move in this direction. It is our belief that modular training should be extended to surface operations and accordingly, we recommend:

that, upon implementation of the modular training program in specialized skills for underground miners, a modular training program for surface operations be developed.

The industry has won wide acclaim for its modular training of underground miners and deservedly so. As noted, the common core modular training program is designed to teach an individual the basic skills required to perform some specific mining jobs. As we see it, the common core program prepares the

new recruit for entry-level work in a mine. However, it addresses neither the issue of initial selection of new employees nor the need to bring the post-common core recruit to working level proficiency.

Given the risks associated with underground mining, we have not been satisfied that screening procedures for the selection of new employees or the attention given to bringing the post-common core recruit to working-level proficiency are adequate. Three dimensional spacial perception, above average motor (hand-eye) co-ordination and mechanical aptitude are human attributes necessary for safe and efficient underground production. Testing for these attributes can and should be done in an initial screening of job applicants. Canadian National Railways, which requires persons possessing similar attributes for its running crews, screens its applicants to ensure that those who are hired do have the basic attributes required. CNR believes that its selection process has resulted in reduced accident rates by screening out applicants who do not possess suitable mechanical and perception capabilities. Mining companies should adopt similar screening programs to identify those who do not have these capabilities before they are exposed to the risks associated with underground work. Accordingly, we recommend:

that the Mines Accident Prevention Association of Ontario investigate and develop appropriate screening tests for prospective underground miners and make these available to the industry.

Although satisfied with the common core program, a number of local unions and individuals, as well as companies, were careful to point out that working-level miners do not emerge from the common core program. There is, therefore, a need to carry through with further training for those who have completed the common core.

Generally speaking, this follow-up training is not being done in any formal way. We have identified the individual production bonus as inhibiting the development of on-the-job training. On the one hand, the new employee wants an opportunity to earn full bonus as soon as he completes the common core. We heard ample evidence of this from common core trainees during visits to a number of mines. On the other hand, the experienced miner on production bonus is reluctant to take the time and effort to train and evaluate the performance of the new employee. We have recommended that individual production incentives be discontinued and that group leaders be utilized on a widespread basis. It is our belief that implementation of both of these recommendations will pave the way for the necessary follow-up training.

We favour a program patterned on the one currently in place at Rio Algom. At Rio Algom, the trainee who has completed the common core is not put on full incentive bonus as in many other mines. He is advanced through four steps which may require up to one year to complete. Prior to each advancement, the trainee is evaluated by his training supervisor, his immediate supervisor, and his fellow workers in the crew. The trainee also completes a weekly progress report which he reviews with his training supervisor. In the result, the skills which the trainee acquired through the common core are reinforced and he is allowed to advance towards full production status as his capabilities permit. We recommend:

that the common core modular training program be augmented by a formal program of on-the-job training leading to full production capability.

The introduction of modular training at both the common core and advanced levels affords the industry an opportunity to upgrade the skills of all of its underground workers, not just new recruits and those seeking promotions. The modular concept, which breaks down each job into its major identifiable

skills or elements, can provide training to an experienced miner who may be lacking in a particular area related to his existing job. A difficulty facing the industry in this regard is in the identification of the shortcomings of existing employees so that the required modules can be pursued in any given case. One company is assigning its experienced employees for retraining in specific areas, where deviations from standard work practices are observed. This use of the modular training concept seems to us to be preferable to the traditional disciplinary response to such deviations. INCO has recognized the general upgrading potential of modular training and has undertaken a comprehensive audit of the skills of its underground miners. Each underground miner is being interviewed to determine the areas in which modular training is needed.

When reference is had to the average length of service of those sustaining fatal injuries in 1980 (over 14 years), it is our view that the approach being taken by INCO has much to commend its broader application. Accordingly, we recommend:

that each mining company undertake a comprehensive audit of the skills of its underground miners with a view to using modular training to upgrade skill levels.

Alcohol and Drugs

We were advised during the course of our inquiry that the use of alcohol and drugs by miners is a factor contributing to accidents. We were given a number of specific examples of unsafe practices engaged in by intoxicated workers. However, the general consensus of those who appeared before us is that miners and mining plant workers do not abuse alcohol or drugs to any greater extent than other groups of workers. It was felt that the incidence of alcohol and drug-related accidents in the mining industry is no greater than that found in industry generally.

It does not appear that there has been a systematic reporting and investigation of accidents from this perspective. This suggests that there is a need for a better understanding of the relationship between alcohol and drug abuse and accidents in the workplace, and a need to gain some insight into the severity of the problem as it might exist in the mining industry.¹⁸

The relevant research suggests that between 10 per cent and 20 per cent of workers generally may be problem drinkers (See Mannello, T.A., *Problem Drinking Among Railroad workers: extent, impact and solution*. University Research Corporation Monograph Series, #4, Washington 1979, and Shain, M. and Groeneveld, J. *Employee Assistance Programs Philosophy, Theory and Practice* Lexington Books, D.C. Heath and Co. 1980).

A problem drinker is defined in the Mannello study as 'a repetitive excessive drinker whose use of alcoholic beverages is regularly and directly linked to private or public harm and is seen as the source of difficulties in one or more important

¹⁸ The Commission requested Mr. Martin Shain, M.A. Dip. Crim., Head, Employee Assistance Program Research, Addiction Research Foundation of Ontario to prepare a paper on the relationship, if any, between alcohol and drugs and accidents in the workplace. The report prepared by Mr. Shain is reproduced in Volume II of the Report.

aspects of his life. This category includes the alcoholic.' The Mannello study, which looked at the implications arising out of problem drinking by employees at seven railroad companies, estimated that 19 per cent of those employed by the railroad companies examined were problem drinkers. The Shain and Groeneveld study, which looked at both private and public sector employers in Ontario, estimates that between 1.9 per cent and 2.8 per cent of the employees in the sampled organizations are in a very high risk category with respect to alcoholism and between 8.7 per cent and 14.8 per cent in a moderately high risk category.

There is no reliable estimate of the prevalence of drug use in industry. It is safe to conclude, however, that in addition to the 10 per cent to 20 per cent of the employee population who may be problem drinkers, there are another 1 per cent to 5 per cent, probably younger in age, who misuse drugs and whose workplace performance is thereby affected. Even if these estimates are liberal, it is clear that a significant number of employees are affected by alcohol or drug abuse.

The claim that alcohol or drug consumption and accidents are related has strong intuitive appeal in that alcohol and many drugs dull the senses and thereby cause inattentiveness and impairment of motor control. A safe worker relies upon his ability to maintain control over his own body and to predict the movements of others. The consumption of alcohol or drugs limits his abilities in this regard.

Recent studies of the relationship between alcohol consumption and accidents support the assertion that alcoholics have between two and three times the accident rate of other employees Pell, S. and D'Alonzo C.A. ('Sickness, Absenteeism of Alcoholics', *Journal of Occupational Medicine*, 12, 198-210, 1970, 'A Five Year Mortality Study of Alcoholics,' *Journal of Occupational Medicine*, 15, 120-125, 1973. 'A Study of Absenteeism, Accidents and Sickness Payments in Problem

Drinkers in One Industry,' *Quarterly Journal of Studies on Alcohol*, 20, 302-312, 1959, Levens, E., *The Cost Benefit and Cost Effectiveness of Occupational Alcoholism Program*, Professional Safety 36-41, November, 1976). In addition to the alcoholic, the problem drinker also experiences a disproportionate share of accidents. These accidents, both to the alcoholic and the problem drinker, may be the result of either the direct or the delayed effects of alcohol consumption. Eye-hand co-ordination, reaction time and other motor-sensory functions may be impaired the day following ingestion of alcohol. Wolkenberg, R.C. et al, ('Delayed Effects of Acute Alcoholic Intoxication on Performance with Reference to Work Safety,' *Journal of Safety Research*, Volume 7, 3, 104-118, 1975, Rybeck, R.S. and Dowd, P.J. After Effects of Various Alcoholic Beverages on Positional Nystagmus and Coriolis Acceleration, *Aerospace Medicine*, 41, 429-435 1970). It was found in this latter paper that professional pilots manifested deficiencies in their performance reactions up to 34 hours after ingestion of alcohol. This finding is of special interest in view of the fact that miners, who operate heavy equipment in confined spaces, require unimpaired motor sensory functions.

Given the type of work done by a miner or mining plant worker, the research suggests that the relationship between alcohol or drug consumption and accidents may be significant in a mining environment. However, we have no way of knowing with certainty the magnitude of the problem. Except for the most obvious cases, an alcohol or drug-related accident may not be recorded as such. The reports which must be filed with the Workmen's Compensation Board, from which the industry's safety records are compiled, focus on the 'what' as opposed to the 'why' of the accident. A more thorough investigation is sometimes not pursued because there may be an unwillingness to disclose that alcohol or drugs were involved for fear of disciplinary action against the victim.

The research that has been done on the relationship between alcohol and accidents in the workplace, allows us to formulate a conservative estimate of the impact of alcohol on accident frequencies in the mining industry. Applying the research which estimates the number of alcoholics in a workforce and establishes that alcoholics account for about three times the number of accidents that befall other workers, we can estimate the impact of alcohol on the overall accident rate. Based on these assumptions, it is estimated that alcoholics, although only 3 per cent of the workforce, accounted for 11.15 per cent, or about 400, of the lost time accidents that occurred in the Ontario mining industry in 1980. If excessive drinking rather than alcoholism were used as the measure, the contribution to accidents would be much greater. The estimate takes no account of drug-related accidents.

Given the estimated dimension of the problem, there is a need to be more certain. It is important to quantify the problem as accurately as possible so that an adequate response can be made by those with both direct and contributive responsibility for safe production. An independent study of the relationship between alcohol, drugs, and accidents in specific mining organizations, and a comparison of the results of this study with the results obtained from a review of the accident reporting forms submitted to the Workmen's Compensation Board by these same organizations, should help to reveal the adequacy of the data base in this area and provide some degree of certainty as to the magnitude of the problem in the Ontario mining industry. If this comparison were to reveal that present records are deficient in identifying the number of accidents which are alcohol or drug related, as we believe they may be, appropriate modifications must be made in the methods of investigation and in reporting.

Insofar as both alcohol and drug use and safety behaviour may be influenced by the socio-technical system of the workplace in which they occur, the study should also encompass an

analysis of the organization and systems of control and communication in place within each of these mining organizations. The purpose would be to determine if the organizational arrangements and the conditions under which individuals work contribute to a higher level of alcohol or drug dependence than may be the case under alternative systems of organization and management. Because of its demonstrated concern for worker safety and its commitment to an open system of management, we believe that Texasgulf should be one of the three organizations invited to participate. We recommend:

that the Mines Accident Prevention Association of Ontario obtain the concurrence of the managements of three major mining operations and commission a study to determine the extent of the relationship between alcohol and drug use and accidents at each of these operations.

that the results of this study be compared with the results of a survey of the accident report forms submitted to the Workmen's Compensation Board by each of these operations; and that, if the results differ significantly, appropriate changes be made in the manner in which alcohol and drug use is identified and reported as a cause of accidents.

that the study include an analysis of the organizational arrangements and the systems of control and communication at each of these operations with a view to determining if these factors contribute to the degree of alcohol or drug use by workers within each operation.

Although companies engaged in the extraction of 'minerals and oil' represent only 0.3 per cent of all work organizations in Ontario, they represent 4 per cent of the organizations known to the Addiction Research Foundation as having employee assistance programs or related rehabilitative programs. Indeed, INCO, the largest single employer, has an extensive

and well-regarded program which is based on joint union management co-operation. These observations suggest that management in the metal mining industry is sensitive to the problems associated with alcohol and drug abuse and do respond positively.

The employee assistance program, which is strongly endorsed by the Addiction Research Foundation, is based on the principle of 'constructive coercion'. The employee, whose deteriorating job performance does not respond to normal supervisory intervention, is offered a choice between disciplinary action or treatment which is arranged for by the employer. One of the most important features of the employee assistance approach is that it diminishes the ambiguity surrounding the perceived consequences of reporting such incidents for both the person who is reported and the person who does the reporting. It is known in advance that the treatment option will be offered. Once a company is committed to treatment as a first step, the positive support of the local union in identifying and assisting workers with alcohol and drug problems should be forthcoming. In these circumstances, the union should advise its members that it is their social and moral duty as well as their legal obligation (See section 17(1)(d) *Occupational Health and Safety Act, 1978*) to refer employees who report for work under the influence or who consume alcohol or use drugs while on duty.

The need for workers to take an active role in supporting an employee assistance program, particularly in an environment where continuous supervision is not possible, is self-evident. In many respects, it appears that the difficulties confronting management and union in a mining environment, in dealing with alcohol and drug abuse, are similar to those faced by the railways with its running crews. Canadian National Railways (Great Lakes Region) and two of its unions have entered into an agreement which has much to commend it to labour and

management in the mining industry as the basis for a joint approach to the management of alcohol and drug abuse within the workplace.¹⁹ The agreement formalizes the company's commitment to provide treatment as a first step in all cases where it is jointly agreed that an addiction problem exists. It also confirms that any employee who is aware that a violation of an alcohol or drug-related rule has occurred but who fails to report the violation or to take action, is himself subject to investigation and possible discipline. We recommend:

that Ontario mining companies and the unions representing workers in the mining industry seriously consider adoption of an approach to the management of alcohol and drug abuse in the workplace along the lines suggested.

¹⁹ This agreement is reproduced in Volume II of our Report as an appendix to the paper prepared for the Commission by Mr. Martin Shain.

Contractors

Contractors are retained by mining companies to perform a wide range of functions. Contract work performed for mining companies may be divided into three general categories: shaft sinking and mining contracting, general contracting, and diamond drilling. In Ontario there are 14 major shaft sinking and mining contracting firms, numerous general contractors and subcontractors and six major diamond drilling firms. The contracting of work allows mining companies to undertake specific projects without having to hire and train additional employees and, in many cases, the contractor brings to bear special expertise which the mining companies do not possess.

The safety record of contractors as a group has not been good. The compensable accident rate for contractors operating in mines and mining plants over the last five years has been worse than that of any of the mining companies, averaging approximately 56 compensable accidents per million man-hours. The average for mining companies over the same period has been 47.8 compensable accidents per million man-hours. As a group, mining contractors accounted for 24 per cent of mining fatalities in 1980.

Contractors who sink mine shafts, excavate underground ramps, carry out lateral mining and create raise openings necessary for production mining are grouped as shaft-sinkers and mining contractors by the Mines Accident Prevention Association. These contractors prepare a mine for production. Employees of mining contractors who work at the development stage, often face very unstable conditions. Their working area is confined, noisy and subject to considerable loose rock movement. However, miners working for shaft sinking and mining contractors are considered to be among the most skilled of all miners. They traditionally receive large production bonuses. Notwithstanding the acknowledged skill of these workers, they have one of the highest accident and fatality rates in the Ontario mining industry. The recent performance of shaft sinking and mining contractor firms has resulted in a Workmen's

Compensation Board assessment which is higher than any other industry group. Shaft sinkers have been assigned a rate of \$18.00 per \$100.00 of payroll. This compares with a rate of \$10.65 for uranium mines, \$8.40 for gold mines and \$6.95 for nickle mines. In 1980, shaft sinkers and mining contractors worked 2,064,700 man-hours, or 3.8 per cent of the total man-hours worked in the industry, but had 10.4 per cent of the fatal injuries.

Mining companies engage general contracting firms (civil, mechanical, electrical, plumbing, painting, etc.) for the construction and installation of major capital works, including mills, smelters, and crushers. Routinely, they also engage a variety of maintenance contractors because of the contractor's specialized skills or equipment. On major projects such as the construction of the new copper smelter and refinery at Texasgulf or the major mill expansion at Denison Mines, many contractors were utilized. At the Texasgulf project, for example, 57 different contractors employing 900 workers were engaged. Although we have not been able to ascertain the exact number of man-hours worked by general contracting firms at mine sites, 13 of the 86 fatalities (15 per cent) which have occurred in the industry over the past five years have involved employees of general and maintenance contractors. We note that records relating to the number of man-hours worked by general and maintenance contractors in the mining industry are not kept, which means accident frequency rates for these contractors as a group, or for individual firms operating within the mining industry, cannot be computed. We suggest that such records be maintained in the future.

Diamond drilling contractors perform two major functions on behalf of mining companies: field exploration drilling and the drilling necessary to delineate and evaluate known ore bodies. The purpose of field exploration drilling is to locate ore bodies and evaluate the opportunity for new mining activity. This drilling produces rock samples known as diamond

drill cores. This type of work is performed at existing mine sites or, as is often the case, in remote locations where workmen and equipment are flown to the job site. Unlike exploration drilling, ore body delineation drilling occurs mostly underground. The primary purpose of this form of diamond drilling is to obtain information about the location and value of the ore and the direction that future mining activity should take. Whether transporting, erecting, operating or disassembling the drilling equipment, drill crews are exposed to significant risk. Although there has been only one fatality to a diamond driller in the last five years, lost time injury frequency for diamond drillers has averaged 86 per million man-hours worked during this period. This is the highest accident frequency in the industry.

We were advised that each mining company requires contractors to work in a safe manner, to comply with the Act and regulations and to conform to company safety requirements as a condition of entering into contractual relations. However, we are satisfied that not all mining companies devote the same degree of attention to contractor safety practices. Upon investigation, we learned that Texasgulf, in contrast to many other companies, makes the contractor aware of precisely what is required, assigns its own safety department to inspect the contractor's crews on an ongoing basis, takes it upon itself to recommend discipline (including discharge) for unsafe work practices engaged in by the contractor's employees and makes it known that it is prepared to terminate contractors (and has on occasion) for unsatisfactory safety practices. Texasgulf has gone so far as to involve itself in the training of contractors' employees. A large structural and fabricated steel manufacturer who performs a considerable amount of contract work in the mining industry advised the Commission that the safety requirements imposed by Texasgulf causes the contractor to budget time and resources beyond what normally would be required in the mining industry. The effort expended by Texasgulf in this regard is reflected in the statistic which shows

that the lost time injury frequency for contractors working at the Texasgulf property is one fifth the provincial average for the construction industry.

Under the *Occupational Health and Safety Act, 1978*, the responsibility to ensure that no workplace is constructed, developed, reconstructed, altered or added to except in compliance with the Act and the regulations, falls to the owner of the workplace. In addition, a constructor—a contractor or owner under the Act—is responsible for ensuring that the Act and regulations are complied with in respect of any project. Beyond this legal responsibility, it is our view that the owner also has a social and moral responsibility to exercise his power and authority over a contractor working on his property to ensure that safe work practices prevail. Indeed, a logical outgrowth of a company's commitment to safety is the imposition of strict safety standards on all contract work. We have not been satisfied that all of the owners of mines and mining plants have assumed the full range of their responsibilities in this regard. Accordingly, we recommend:

that whenever a contractor is engaged, the company meet with the contractor before commencement of the project to stipulate the safety requirements which must be met if the contractor is to be permitted to commence or continue the project.

that the project be rigorously inspected by the company to ensure compliance with these requirements.

that a mining company give preference in the awarding of contracts to contractors who have demonstrated satisfactory safety performance; and that the company consider a reward-penalty contract provision related to safety performance on the project.

The generally unsatisfactory safety performance of contractors suggests that the Mining Health and Safety Branch should accelerate its compliance efforts in this direction. We understand that inspections have concentrated on the projects of shaft sinkers, mine contractors and diamond drillers working on mining properties. The projects of general contractors and the work of diamond drillers engaging in exploration work are inspected only infrequently. There is no requirement for diamond drillers to inform the branch of the time and location of drilling, which means that inspection is difficult. We are satisfied that additional inspection is required in this area and, accordingly, we recommend:

that the Mining Health and Safety Branch be advised by each mining company of all contract projects well in advance of the starting date of such projects.

that the Mining Health and Safety Branch increases its regular inspections of these projects and, using its accident profile data, devote special attention to those contractors who demonstrate unsatisfactory safety performance.

The ability of the contractor to quote competitively is essential to his survival. We have recommended that Workmen's Compensation assessments levied against companies working in the mining industry, including contractors, be linked to safety performance. The assessments presently levied on contractors are substantial. But, because of the rate grouping structure and the absence of merit rating, these assessments are a fixed cost applicable to all of the contractors who may be bidding for a particular piece of work. It is our view that a properly

designed and applied merit rating scheme would serve as an incentive to contractors to improve their safety performance. Accordingly, we recommend:

that a system of merit rating for purposes of determining the amount of the Workmen's Compensation assessment for contractors operating in the mining industry be established; and that separate rate groups be established for shaft sinking and mining contractors, general contractors and diamond drilling contractors.

We have discussed, in detail, the concept of direct responsibility for the performance of safe work. The analysis and recommendations contained in Section 1 of our Report are directed to mining companies, but pertain equally to contractors. We have recommended that the owners of mines and mining plants and the government take steps designed to improve the safety performance of contractors. We are convinced that these recommendations will bring external pressure to bear which will result in improved contractor safety performance. However, we are equally convinced that contractors themselves must recognize the importance of safety and make the necessary internal commitment to safe production. We note, with regret, that not a single contractor appeared before the Commission. We recommend:

that the chief executive officer of each contractor engaged in projects for Ontario mines and mining plants review his personal commitment and contribution to the safety performance of his organization with a view to exercising his authority and leadership in the appropriate manner.

We are advised that shaft sinking, mining and diamond drilling contractors pay employees large bonuses based either on the volume of production over a given period or on satisfactory

completion of a project within specified time limits. For many of the reasons cited in support of our recommendation to discontinue individual production bonuses in underground mining, we strongly suspect that the payment of these bonuses by contractors has a negative impact on safety performance. However, because of the time constraints facing the Commission, we were unable to thoroughly investigate the possible connection between the accident experiences of these contractors and the payment of bonuses. In the result, we are not prepared to make a recommendation in this regard. However, if the recommendations we have made pertaining to contractors do not result in a significant improvement in safety performance, it is our view that a thorough investigation of the possible relationship between accidents and the payment of these bonuses should be undertaken.

Accident Data Base

The adequacy of the accident data base will determine the extent to which safety performance can be measured, causes of accidents identified and exposure to risk of sub-groups within the worker population ascertained.²⁰ Implications for the design of accident prevention programs and the formulation of government administrative and policy initiatives are obvious. The prerequisites to an adequate data base are:

- clear and unambiguous definitions of which accidents are to be included in the reporting;
- a profile of each reportable accident (how, when, where, why, severity, etc.) matched with a profile of the worker who has suffered the accident (age, service, occupation, shift, etc.);
- current data on the aggregate (by firm and by industry) number of workers within defined worker sub-groups (age, service, occupation, shift, etc.). These data are required in order to calculate rates of accidents for sub-groups and, thereby, to identify those who may be at high risk.

The data base as it pertains to accidents in the Ontario mining industry as a whole meets none of these prerequisites. Although the aggregate data with respect to sub-groups are available within the personnel records of individual companies, they are not collected. The Commission was required to request these data from individual firms within the industry and to compile them.

²⁰ The Commission retained Harry Shannon, Assistant Professor, Occupational Health Program, McMaster University, to up-date the statistics produced in the Ham Report, and to report on the accident data base in the Ontario mining industry. The paper which he prepared is reproduced in Volume II of our Report. Professor Shannon holds a Ph.D. in statistics and has specialized in the area of occupational health and safety statistics.

The form submitted by the employer to the Workmen's Compensation Board (Form 7) in conjunction with each accidental injury or industrial disease, is presently used to obtain the information necessary to identify causes of accidents. However, the primary purpose of this form is to provide information upon which to judge compensation claims. It is not surprising, therefore, that this form is inadequate as a means of identifying the causes of accidents.

We are advised that the Workmen's Compensation Board is reluctant to modify the form further because of a fear that increased complexity would delay its return and hence, the payment of benefits. This concern appears reasonable. It is to be noted that the Construction Safety Association of Ontario has designed a questionnaire to elicit 'accident causal data'. There are no such forms in use in the Ontario mining industry for this purpose, although the Mining Health and Safety Branch presently identifies and analyses the causes of serious accidents. We have made specific reference in this Report to the lack of reliable data with respect to the relationship between accidents on the one hand and inadequate lighting and alcohol or drug use on the other. It is apparent to us that an improved accident reporting format is required.

The final prerequisite for an adequate data base relates to the need for a clear and unambiguous definition of which accidents are to be included in the reporting. The definition must include the universe of companies from which accidents are to be reported, the nature of the accidents to be reported, the severity of the accidents to be reported, and the time an accident will be considered to have occurred.

The jurisdiction of the Mining Health and Safety Branch extends to open pits and quarries, oil drillings, open hearths associated with steel making, diamond drillers and mining contractors, mines and mining plants. In our view, separate data should be

maintained for each of these categories. However, we are especially concerned that a separate data base be maintained for all mines and mining plants.

The reporting should relate to traumatic injuries of some minimum severity, as distinct from illnesses or diseases (hearing loss, 'white hand' and other diseases). Because of the reliance on form 7, there is presently no accounting for traumatic injuries which do not result in a claim for Workmen's Compensation benefits. Therefore, accidents which result in injury and some form of modified work at full pay are not reported. If the data base is to facilitate the evaluation of performance and identification of trends and risk factors, these types of accidents must be reported.

The reporting of all such accidents should be made within some minimum period following the accident so that accurate records can be maintained for each time period and an analysis completed as soon as possible following each period.

The absence of a single entity charged with responsibility for the collection, analysis and dissemination of statistical information relating to safety performance in the Ontario mining industry, has contributed to the current shortcomings in the data base. This situation should be remedied. Both the MAPAO and the Mining Health and Safety Branch currently collect through the Workmen's Compensation Board and do some analysis of this accident data. However, neither organization is held responsible for maintaining the overall data base.

In our view, the responsibility for the collection, analysis and dissemination of accident data should rest with the Occupational Health and Safety Division of the Ministry of Labour. The division requires this information for its policy and administrative decision making with respect to occupational safety. More particularly, the Mining Health and Safety Branch of the division requires this information to determine inspection

schedules, to implement the hazard identification program and to measure the impact of these and other initiatives. Branch inspectors already collect causal information on serious accidents. Having regard to the foregoing, we recommend:

that the Ministry of Labour, in consultation with management, labour, and the Mines Accident Prevention Association of Ontario, determine the specific information required to maintain an occupational accident data base for mines and mining plants which satisfies the prerequisites identified, and provide the Occupational Health and Safety Division of the Ministry with the resources and expertise necessary to collect this information, analyse and disseminate it.

We anticipate that the implementation of this recommendation will result in increased reporting requirements upon individual companies. At the least, there will be a need to provide aggregate data relating to worker sub-groups and causal data relating to individual accidents. We assume that each mining company will willingly comply with these reporting requirements.

Jurisdictional and Administrative Arrangements for the Safety of Ontario Uranium Miners

The Parliament of Canada, in the preamble to the *Atomic Energy Control Act*, R.S.C. 1970, cA19, states that it is essential in the national interest to make provision for the control and supervision of the development, application and use of atomic energy. The Act asserts federal control over atomic energy from the discovery of uranium bearing ores and the mining and processing of these ores to the ultimate use of prescribed substances. Federal jurisdiction rests on the provisions of section 91 of the *British North America Act* which provides for federal authority over matters declared to be for the peace, order and good government of the Dominion. The regulation of business is ordinarily within provincial competence under section 92, head 13—Property and Civil Rights in the Province—of the *British North America Act*. Thus the provincial government has jurisdiction over mining within Ontario with the exception of uranium mining which falls under federal jurisdiction.

An issue has arisen before the Commission over the extent and validity of the statutory safety protection for uranium miners and mining plant workers in Elliot Lake. It has been suggested that the federal regulation covering uranium miners and mining plant workers in Elliot Lake may be invalid, thereby leaving these workers with minimal statutory occupational health and safety protection. It has also been suggested that even if the federal regulation is valid, the coverage provided under the federal statute is inferior. Finally, it has been suggested that the administrative arrangements which have been established to enforce the statutory protections are confusing and ineffective. The uranium mining companies and the unions representing uranium miners and mining plant workers are agreed that the uncertainty about the validity of the federal regulations and the difficulties attendant on administering the statutory framework are adversely affecting safety performance in Ontario uranium mines and mining plants.

The issues which have arisen before us over the validity and adequacy of the occupational health and safety protection

afforded to Ontario uranium miners and mining plant workers must be examined in light of recent history in order to be clearly understood.²¹ Provincial law governing the occupational health and safety of miners was applied to uranium miners and mining plant workers prior to 1978. This was done by means of the licence to operate granted by the Atomic Energy Control Board pursuant to its authority under the *Atomic Energy Control Act*. These licences were made conditional on compliance with the provincial law. Notwithstanding the conditions attached to the granting of the licence to operate, the enforceability of the provincial statute was in doubt, as was the right of inspectors appointed under provincial statute to enter the premises of uranium mining companies for the purpose of inspecting or otherwise ensuring compliance with the provincial legislation. In anticipation of proposed revisions to the *Atomic Energy Control Act*, discussion took place between federal and provincial officials in 1977. The purpose of this discussion was to overcome enforcement problems and to otherwise improve administrative arrangements. The Select Committee on Hydro Affairs reported that:

‘Correspondence and minutes of meetings during this time make it apparent that there was a general framework of agreement on the constitutional power of the two levels of government to enact laws in this area. It appears to have been agreed that federal legislation could, by virtue of the legal doctrine of paramouncy, render any provincial laws on occupational health and safety inoperative insofar as uranium mines were concerned. But it was also agreed that the federal power to legislate was a concurrent one shared with the provinces. A concurrent responsibility means, that if there is no conflicting federal

²¹ The report of the Select Committee on Ontario Hydro Affairs dated December 1980, contains a useful history of the events influencing the present occupational health and safety arrangements affecting Ontario uranium miners.

legislation, a province could, under certain circumstances, make general employee health and safety laws that are applicable to federal undertakings.'

In late 1977, Labour Canada indicated that it was preparing mining health and safety regulations for inclusion in Part IV of the *Canada Labour Code*. The Ontario Ministry of Labour suggested that relevant provincial laws be incorporated by reference into the federal code instead. During the course of these discussions, the United Steelworkers of America, as the bargaining agent of the Elliot Lake uranium miners and mining plant workers, sought to have its members protected by the federal legislation. It did so because of what it perceived to be the superior protections offered by the federal legislation, especially in the area of a worker's right to refuse unsafe work. In response to these developments, the Atomic Energy Control Board, which had heretofore provided for the conventional health and safety protection of the Elliot Lake miners by granting licences conditional upon compliance with provincial health and safety law, sought a legal opinion on the applicability of the *Canada Labour Code* to nuclear facilities, including uranium mines and mining plants. The opinion, prepared by the federal Department of Justice, concluded that Part IV of the *Canada Labour Code* applied to these facilities, in that there was nothing in the *Atomic Energy Control Act* or regulations which displaced the provisions of the code dealing with conventional health and safety. The opinion also concluded that the federal authority was exclusive. If correct, the result was that provincial law had no force or effect, except to the extent that these laws were incorporated into the AECB licences. The Ontario Ministry of Labour sought its own legal opinion²² which confirmed the authority of the federal government to pass

²² Prepared by John R. Robinette, Q.C. of the firm of McCarthy and McCarthy, dated December 27, 1978.

legislation dealing with the health and safety of uranium miners but concluded that it is:

‘fairly arguable that if there is no conflicting Dominion legislation a province can make applicable to Dominion undertakings general employee health and safety laws provided that they are not aimed directly and exclusively at a Dominion undertaking and provided that they do not interfere with the physical plant of the Dominion undertaking or the construction, repair and alteration of the Dominion works.’

The two legal opinions referred to above differ on whether or not the federal authority to regulate the health and safety of Ontario uranium miners and mining plant workers is exclusive or concurrent.

Although Bill 70, a comprehensive piece of occupational health and safety legislation, was about to be passed by the Ontario legislature in August 1977, Labour Canada took the temporary measure of incorporating by reference Part IX of the then *Ontario Mining Act* as a regulation under Part IV of the *Canada Labour Code*. This regulation was to apply to Ontario uranium miners and mining plant workers. An arrangement was worked out under which inspection would continue to be carried out by provincial inspectors. The federal government then struck a tripartite committee to draft permanent regulations to cover these workers. A working draft was completed by March 1980. However, in April 1980, the United Steelworkers, whose consistent objective has been to have its members covered by the legislation providing the most comprehensive coverage, advised Labour Canada that its objective could now best be met if its members were under provincial law. By this time Ontario had passed the *Occupational Health and Safety Act*, 1978 and regulations covering mines and mining plants. In the result, the Elliot Lake workers were then in the position of having the provisions of the old *Ontario Mining Act* apply to

them while all other miners and mining plant workers in the province were covered by the more recent *Occupational Health and Safety Act, 1978*. However, in May 1980, in order to end this anomalous situation, the federal government adopted the new Ontario *Occupational Health and Safety Act, 1978* and regulations as a regulation under Part IV of the *Canada Labour Code*. Provincial health and safety inspectors have been designated as federal health and safety inspectors thereby permitting a continuation of the provincial administration of the statute governing conventional health and safety in Ontario uranium mines. The province is reimbursed by the federal government for the expenses incurred by it in this activity.

Given the foregoing, three distinct issues have been identified to the Commission. The first relates to the adequacy of the legislative coverage. The regulations passed pursuant to the *Canada Labour Code* incorporating by reference the Ontario Act and regulations provides Ontario uranium miners with coverage identical to that enjoyed by other Ontario miners with three exceptions. These exceptions arise because, as a general rule of law, a statute takes precedence over regulations where the two are in conflict. In this case, the Ontario Act and regulations are incorporated by reference as a regulation under the *Canada Labour Code*. The *Canada Labour Code* differs from the Ontario Act in three areas and hence the code takes precedence in these areas. These are:

- the right to refuse work. Under the *Canada Labour Code*, this right exists where the worker has ‘reasonable cause to believe’ that he is in ‘imminent danger’. Under the Ontario *Occupational Health and Safety Act, 1978*, this right exists where the worker has ‘reason to believe’ that a situation exists which is ‘likely to endanger’ himself. Appeals from the imposition of discipline arising out of the exercise of the right to refuse unsafe work are heard before the Ontario Labour

Relations Board under Ontario law, but before the Canada Labour Relations Board under federal law.

- Health and safety committees—under the *Canada Labour Code* the establishment of these committees is at the discretion of the federal Minister of Labour. Under the *Ontario Occupational Health and Safety Act, 1978* health and safety committees are mandatory. The federal minister has ordered committees to be established in the Ontario uranium mines and mining plants and these are expected to be established in the near future.
- Prosecutions—violations of federal law must be prosecuted by federal Justice Department authorities while violations of provincial law are prosecuted by provincial authorities.

The United Steelworkers believe that the federal provisions which prevail in these areas are inferior to their provincial counterparts. The federal government takes the position that, in practice, Ontario uranium miners have equivalent, if not identical, protection under its code.

The second issue which has been identified, relates to administrative efficiency. The officials of the ministry who appeared before the Commission in Elliot Lake advised that there is an added element of difficulty in administering the two statutes. Both the uranium companies and the United Steelworkers stated that the condition was confusing at best. The companies were of the view that their miners and mining plant workers should be covered by whatever legislation the workers considered to be the most advantageous to themselves.

The third issue which has been identified, relates to the validity of the adoption by reference of the Ontario statute and regulations as a regulation under the *Canada Labour Code*. The Select Committee on Ontario Hydro Affairs obtained a legal

opinion²³ that the registration requirements of sections 5 and 6 of the *Statutory Instruments Act*, S.C., 1920-71-72 C. 38 may apply to the *Occupational Health and Safety Act, 1978* and regulations themselves, and not just to the language used to incorporate the provincial law as a regulation under the *Canada Labour Code*. While copies of the adopting federal regulation, S.O.R./80-408 were transmitted to the clerk of the privy council in English and French, and registered pursuant to S. 6 of the *Statutory Instruments Act*, the text of the Ontario *Occupational Health and Safety Act, 1978* and regulations was not. The select committee concluded therefore, 'that there is a very real possibility that the Government of Canada has not met the technical requirements of the *Statutory Instruments Act* and that, as a result, Ontario's uranium mine workers are operating wholly without the legal protection they are entitled to and have been assured they have.'

Because of the legal complexities surrounding the issues relating to the jurisdictional and administrative arrangements covering Ontario uranium miners, this Commission obtained independent legal advice on these issues.²⁴ We sought an opinion on the validity of the federal regulation incorporating by reference the Ontario Act and regulations. Assuming the federal regulation to be valid, we sought an opinion on the difference, if any, between the right to refuse unsafe work under the two statutes. Finally we sought an opinion on whether or not the federal jurisdiction to regulate the health and safety of uranium miners is exclusive or concurrent.

The advice we received reviewed the provisions of the *Statutory Instruments Act* in light of the issue which has been identified and concluded, contrary to the opinion received by the select

²³ Prepared by Professor John B. Laskin of the Faculty of Law, University of Toronto, dated August 29, 1980.

²⁴ The Commission retained Pierre Genest, Q.C., of the firm of Cassels, Brock, to provide a legal opinion on these issues. The letter from the Commission to Mr. Genest setting out the questions to be answered, and his opinion, are reproduced in Vol II of our Report.

committee, that the provincial legislation is not a 'statutory instrument' within the meaning of the *Statutory Instruments Act*. Accordingly, we have been advised that the federal regulation is 'not subject to attack on the grounds that the adopted Ontario legislation and regulations have not themselves been registered under the *Statutory Instruments Act*.'

The position of the United Steelworkers on the extent of the right to refuse unsafe work under the federal code is supported by the legal opinion received by the Commission. We are advised:

'that the standard set by "imminent danger" as opposed to "likely to endanger" is significantly different. The Shorter Oxford Dictionary defines "imminent" as impending threateningly, hanging over one's head, ready to overtake one.'" The word "imminent" thus connotes a temporal immediateness to the danger, as well as a near certainty of the danger, actually being present. On the other hand, "likely" is defined in the same dictionary as "having an appearance of truth or fact; seeing as if it would happen, or prove to be as stated; probable.'" Thus, it is my view that "likely to endanger" only necessitates proof of a probability of the occurrence of the danger, and contains no requirement as to the immediateness of the danger.'

The Ontario legislation establishes a wider basis for an employee's right to refuse work.

The opinion received by the Ontario Ministry of Labour in December 1978 concluded that it is fairly arguable that federal jurisdiction to regulate the conventional health and safety of uranium miners is concurrent. In other words, it is fairly arguable that provincial legislation applies so long as it is not in operational conflict with the federal legislation. An operational conflict occurs where compliance with provincial law involves

a breach of the federal law. No such operational conflict exists with respect to the two pieces of legislation with which we are concerned. The provincial law provides somewhat superior coverage in respect of a worker's right to refuse unsafe work and the establishment of health and safety committees. However, the provincial law does not conflict with the federal law in the sense that compliance with the provincial law results in a breach of the federal law. The practical result of the concurrent operation of the two statutes requires those who are covered to meet the higher standards.

The opinion we received expresses complete agreement with the opinion obtained by the Ontario Ministry of Labour and dismisses the opinion given to the Atomic Energy Control Board by the federal Justice Department because it did not discuss the issue and relied on a single case. The opinion we received cites additional authority for the conclusion that 'the court would likely hold that, subject to the qualifications mentioned in Mr. Robinette's opinion, provincial health and safety standards of general application apply concurrently with federal regulation to federal works and undertakings.'

Having reviewed the submissions made to us and the legal opinions which have been prepared, we are satisfied that:

- Although the federal regulations incorporating by reference the provincial Act and regulations is probably valid, a cloud has been cast over its validity by reason of the Laskin opinion and the conclusions reached by the Select Committee on Hydro Affairs.
- Provincial health and safety standards of general application apply concurrently with federal law to federal works and undertakings subject to the paramourcy of federal law.

- The provincial law provides superior coverage in respect of a worker's right to refuse unsafe work and the establishment of health and safety committees.

Having regard to these conclusions, it falls to the Commission to shape recommendations which will resolve the current state of confusion and uncertainty which surrounds the statutory health and safety protection extended to Ontario uranium miners and plant workers.

In framing our recommendations, we are governed by two overriding considerations: the need for certainty and the need for uniformity. Ontario uranium miners and mining plant workers and the companies which employ them, are entitled to know with absolute certainty whether the federal statute which purportedly provides minimum protection in the area of conventional health and safety is valid law. They are also entitled to know whether the provincial law operates concurrently.

Turning to the advantages of uniformity within the industry, the Ontario uranium miners and mining plant workers perform the same type of work as miners elsewhere in the province. They are part of the same labour market—evidence the standard training programs and the movement of workers between companies—and belong to the same union which represents the majority of underground hard rock miners in Ontario. As one would expect in these circumstances, statutory protection which is either better or worse than that provided elsewhere within the Ontario mining industry leads to ferment and unrest; either among uranium miners or among other miners. Furthermore, the energies given to achieving what is perceived as the superior coverage detracts from the day-to-day safety effort. When reference is had to our recommendation that statutory provision be made for full-time worker safety representatives,

it is especially relevant that both levels of government understand and act to achieve uniform statutory coverage within the Ontario mining industry. Both levels of government must take the steps necessary to achieve the objectives of certainty and uniformity.

The union representing Ontario uranium miners and mining plant workers seeks the coverage provided by provincial law. The Ontario uranium companies do not oppose this result. The federal government has already taken a major step in this direction. We have discussed the need for certainty and uniformity. Accordingly, our recommendations are designed to bring about conventional health and safety protection for Ontario uranium miners which is beyond legal challenge and which is identical to that enjoyed by other Ontario miners. Having regard to the foregoing, we recommend:

that the Government of Canada incorporate by reference the Ontario Act and regulations, as amended from time to time, directly into the Canada Labour Code as a provision covering uranium miners and plant workers, and also provide in the code that, where the other provisions of the code and this provision are in conflict, the latter shall apply.

The authorities indicate that there is no constitutional bar to incorporation by reference into a federal statute the statutes of a province as they may exist from time to time. The effect of such an incorporation would be to cover uranium miners and mining plant workers by provisions identical to those applying to other miners in Ontario at any point in time. Furthermore, any possible difficulty respecting the *Statutory Instruments Act* is obviated as the provincial enactments are

incorporated directly into the federal statute. Therefore, none of the requirements of the *Statutory Instruments Act* would have to be satisfied. Accordingly, we recommend:

that the Government of Canada proceed by way of a reference to the Supreme Court of Canada by the Governor General in Council under section 55 of the Supreme Court Act, R.S.C. 1979 C. S-19 and determine whether the federal jurisdiction is exclusive or concurrent.

The reference to the Supreme Court will allow all interested parties to argue the matter and will provide an answer that is final and conclusive for all purposes. If the jurisdiction is found to be concurrent, as we believe it is, the inspection and appeal provisions in both statutes are concurrently applicable. If this is the case, it is our view that, in the interests of uniformity, the provincial mechanisms be utilized exclusively.

Our final recommendation in this area pertains to the administrative arrangements to ensure compliance with the statutory requirements. If we are striving for uniformity within the industry and if consistency of administration and enforcement is desirable, as we believe, then clearly the provincial inspection service should be utilized. The provincial inspection service is well regarded and is in a position to apply common standards within the industry.

There is currently in place, an arrangement between the federal and provincial governments whereby provincial inspectors are responsible for ensuring compliance with federal law within Ontario uranium mines. As we understand it, this arrangement came about because Labour Canada actively moved into the field of conventional health and safety for uranium miners at a time of fiscal restraint. Provincial inspectors were performing the inspection function at the time and rather than hire and train its own federal inspection staff, an agreement was worked

out with Ontario. Whatever the origins of this arrangement, it is imperative that it continue in place for reasons of consistency and uniformity. We recommend:

that the Governments of Canada and Ontario continue the arrangement under which the enforcement of statutory health and safety requirements in Ontario uranium mines is assigned to provincial authorities.

Production Bonus

Most underground development and production miners in Ontario are paid on the basis of the quantity, or volume, of their production and have been for many years. The workers at Texasgulf—700 out of a total of about 17,000 underground miners in Ontario—are paid a fixed amount irrespective of the quantity of ore produced. They are paid on a salary basis which, in late 1980, equated to about \$25,000 per annum. About 150 miners at the Algoma Ore property, are paid a base rate plus an amount, about 20 per cent of base, tied to the overall output of the mine over a fixed period. At the time of our hearing, INCO's McCreedy West Mine operated under substantially the same system, but the average incentive payout was in excess of 50 per cent of base rate. All other development and production miners working in the province are paid on the basis of some variation of the standard hour incentive plan.

The standard hour incentive plan is based on a system of work measurement whereby the content of a job is measured using time study techniques to establish standard times. The standard time is defined as the time it takes an average qualified worker to complete the job working at normal pace using proper operating procedures. An average qualified worker is a worker who is considered representative of all the workers at a particular location. He is considered to have the necessary physical attributes, intelligence and education and to have acquired the necessary skills and knowledge to carry out the work in hand to satisfactory standards of safety, quantity and quality. We will refer to the implications of the incentive system for the below-average miner later in this section. Normal pace involves physical effort, which is equated with walking at three miles per hour and includes 15 per cent for relaxation. The standard time incorporates all of the time that the average worker takes, working at normal pace, to do the job to the standards of safety and engineering required by the company. In addition, it includes 'process allowances' to cover non-productive

activities such as travel, lunch, personal needs, mechanical delay, general preparation and discussion with supervision.

Incentive payments are determined by having a separate incentive contract for each workplace or group of workers; the size of the group being the smallest that can be identified readily with a specific measurable output. For example, one stope may be on a single contract and the measurable outputs will be tons of ore produced, tons of fill poured, number of roof bolts installed, etc. The contract will cover the number of men who work in the stope over the contract calculation period, which is usually one month.

The amount of the incentive is a function of the miner's negotiated base rate and the amount of time he takes to complete the jobs he has been assigned relative to the standard hours for each job. Standard hours for a contract are calculated as follows:

No. of units (jobs) produced during contract period	×	Standard man- hours allowed per unit (incentive standard)	=	Total standard man-hours allowed
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In order to determine the individual's (or group's) contract performance, the total standard man-hours allowed is expressed as a percentage of the actual hours required to achieve the outputs. The individual's base rate is multiplied by this percentage or by some percentage derived from it, in order to determine the individual's incentive rate. This figure is then multiplied by the number of incentive hours contributed to the contract to arrive at the individual's total incentive earnings for the period. The less productive bonus- or incentive-miners earn at least 120 per-cent of base rate, while a superior incentive-miner may earn upwards of 200 per cent of his base rate.

We identified the incentive system as an issue to be examined by the Commission. We did so on the basis of the Texasgulf experience and on the basis of the 1980 fatality data which was before us. At the time that we circulated the issue document, there had already been 18 fatalities during 1980 in Ontario mines and mining plants (excluding pits and quarries). Fourteen (77 per cent) of these fatalities occurred underground and all fourteen were either bonus-miners or others struck or crushed by equipment operated by bonus-miners. Bonus-miners account for only 40 to 70 per cent of the underground worker population depending on the operation. In light of the very high proportion of underground fatalities involving bonus-miners, the Commission was of the view that we should investigate whether a cause-and-effect relationship exists between incentive schemes and underground fatalities generally.

The Texasgulf experience also caused us to raise the incentive system as an issue to be investigated. As noted, Texasgulf is the only mine to pay its underground development and production miners on an annual salary basis in contrast to the traditional base rate plus bonus. The miners employed by Texasgulf are the only miners working in Ontario whose remuneration is not directly dependent upon the quality of production.

No Texasgulf miner has ever suffered a fatality and, as is noted in the introduction to our Report, the Texasgulf accident frequency experience has traditionally been in the order of ten times lower than the industry's average frequency. As of September 1, 1980, the Texasgulf accident frequency performance year-to-date stood at 1.6 lost time accidents per million man-hours worked. The industry average frequency was over 40 lost time accidents per million man-hours worked for the same period. While recognizing that Texasgulf's employees are not unionized and that the company is in a strong financial position, we nevertheless concluded that the Commission should

investigate whether a cause-and-effect relationship exists between the Texasgulf safety performance and the fact that its miners are remunerated on a salary basis.

A number of local union representatives and individual miners informed the Commission that the incentive system is contributing to accidents. One local union went so far as to assert that production incentives may be costing lives. We were told that miners may work too quickly, fail to perform necessary housekeeping chores, disregard maintenance of tools and equipment, superficially scale, fail to wear safety belts in appropriate circumstances and disregard other safety procedures when paid on the basis of an incentive scheme that rewards production. We will have more to say later concerning the solution proposed by these unions.

Industry spokesmen deny that production incentives contribute to accidents or fatalities. They rely on the design of the standard hour plan which provides the time necessary to perform all safety-related tasks, and allows an individual to work at a relaxed pace and still earn in excess of 20 per cent above his base rate. Although no comprehensive independent research has been done within the industry, some of its spokesman rely on data which show that the highest bonus-earners are the safest underground workers and also that the frequency of accidents suffered by bonus-miners is only slightly higher than that for the overall worker population. The industry submits that this higher frequency is because of the risks inherent in the work. Mining companies (with the exception of Texasgulf and Algoma Ore) argue that the incentive system is required to maintain production at acceptable levels, to combat absenteeism and to attract and retain skilled workers who otherwise would leave and go elsewhere, perhaps to other provinces where the incentive bonus is paid. The issue was clearly joined before us.

The incentive system we have described is designed to impact on the way an individual works. One of the major companies defined the incentive system as 'a system wherein a worker is offered extra pay above the base rate in return for extra effort, which results in an increase in efficiency and a reduction in unit costs.' The objectives of the incentive system are described: to induce the miner to work for the full available number of minutes in the shift, to work faster than normal pace, to increase output, to create a perceived equity between employees and job performance and to induce responsible and effective work with a minimum of supervision. This company submitted that by virtue of the incentive system 'the employee can increase his earnings by working longer and faster. He can also, in many cases, improve his earnings by planning his work effectively and by improving his skill and dexterity.' The underlying premise is that an employee will extend himself to a greater degree for an incentive payment than he will for a flat amount of compensation, particularly in an environment where continuous supervision is not possible. The Commission acknowledges that such a view is conventional and widely held. Nonetheless, the Commission is of the view that there are other ways to motivate the underground miner.

We question the extent to which an individual miner controls the pace of his work in a mechanized mine where, to a considerable extent, the jack leg and the slusher have given way to the drill rig and the scoop tram. We suspect that the mechanical support staff in a mechanized mine is equally as important to production as the production miner. We note that both Texasgulf and Algoma Ore appear to maintain satisfactory production levels. However, we do not dispute that an individual who can earn up to double his base rate on the basis of his

output will attempt to maximize his earnings and may, in so doing, behave quite differently from a miner who is paid a flat rate or salary.

The difficulty with the incentive system, from a safety point of view, is the absence of direct control. The absence of continuous supervision is at one and the same time, the primary reason for adopting the system and the primary reason for questioning its potential negative impact on safety. Without direct supervision, there is no way of controlling the behaviour of those who are attempting to maximize earnings. In most cases, the individual will apply himself to his job and put forth maximum effort within defined standards. In other cases, however, the worker may over-extend or abuse his equipment, work at a pace which brings on fatigue, take short cuts or otherwise deviate from standard practices in an attempt to realize his maximum potential earnings. The company has no way of systematically preventing such behaviour which, if it occurs in even a small minority of cases, will prove costly in terms of serious accidents and even fatalities.

Given the desire of workers to realize maximum potential income—the underlying characteristic of human nature upon which the incentive system is built—and given the various levels of ability among miners and the range of working conditions which exist underground, it is not surprising that some incentive-miners deviate from standard work practices from time to time. We have been told and we accept that this is the case. It logically follows that these deviations contribute to accidents and fatalities underground. Our investigations tend to support this conclusion and they also suggest that the current standard hour incentive plan produces a number of other ramifications which can be counter-productive to good accident prevention programs.

The literature dealing with the relationship between incentive schemes and occupational accidents admittedly is sparse. In

addition to relevant Swedish studies, we were able to uncover only two other papers on the topic; none of these examined the mining industry.

The first study, McKelvey, Robert K., Engew, Trygg and Beck, Marjorie B.; ('Performance Efficiency and Injury Avoidance as a Function of Positive and Negative Incentives,' *Journal of Safety Research*, March 1973/Vol. 5/Number 1), used volunteers in a simulated working environment. This study investigated subjects' attentiveness to a warning device and their care in manipulating a power tool under different incentive schemes. The authors found that 'while incentive pay clearly increases production, it may also increase the number of errors affecting both the equipment and the operator.' However, it was found that a balance between positive and negative incentives did increase hazard awareness without significantly sacrificing performance efficiency.

The second study, 'The Effect of Piecework on Accident Rates in the Logging Industry,' Mason, Keith, (Worker's Compensation Board of British Columbia) *Journal of Occupational Accidents*, Vol. 1/Number 3, July 1977), attempted to determine whether piecework affects accident rates for buckers and fallers in the British Columbia logging industry. The author categorized 1,430 accident claims for the year 1972 on the basis of whether the claimant was paid by piecework or by salary. The relevant conclusions reached in this paper are, firstly, that age is the most important variable affecting accident rates, with accident frequencies increasing as the age decreases; secondly, that the method of payment does not affect accident frequency; and, thirdly, that the method of payment does affect the severity of accidents. Regarding this latter point, it was found that piecework loggers are away from work an average of six days more per accident than salaried or hourly rated loggers. The conclusion reached in this paper with respect to the severity of accidents occurring to piecework loggers,

is particularly relevant to the mining industry where the risk of severe accidents underground is acknowledged.

The recent Swedish experience in switching from incentives to fixed wages in its forest industries (1975) and in a large state-owned mining company (1970) support the conclusions reached in the two research papers we have cited. There has been considerable research on the safety-related effects of these Swedish developments.²⁵ The Swedish research findings have been summarized on page 14 of *Psychosocial Aspects of Industrial Production Methods*, Bertil Gardell, Reports from the Department of Psychology, University of Stockholm, November 1979, as follows:

‘A possible connection between remuneration systems and accident rates has been widely discussed. In Sweden several practical experiments from various industries introducing fixed salaries have been evaluated from this point of view.

‘In a large state-owned mining company the introduction of fixed salaries has been followed by an independent research team (1-year follow up) as well as by the company itself (3-years follow up). Both studies show a steep decline in severe accidents (cases requiring more than 90 days of sick-leave), a smaller decline in medium severe cases (7-90 days of sick-leave) and a raise in minor accidents. In both studies the conclusion is drawn that fixed wages signifies less stress and less risk-taking.

²⁵ LAU: *A Report on Wage Administration Following Changes Implemented After the Strike at LKAB in 1969-70.*

The Effect of the Wage System on Safety and Work Organization, Carin Sundstrom-Frisk, Worker Safety Board.

From Piece Rate to Monthly Salary: Evaluation of a Wage System Change in Highly Mechanized Work, G. Aronsson, Report No. 14 (1976) Department of Psychology, Stockholm University.

The Effect of the Wage System on Productivity in Conventional Forestry Cutting, Marit Werner.

In the independent study the raise in minor accidents is explained by referring to the possibilities for workers under fixed wages to attend to minor accidents without loss of income. The company study also points out an overall loss in productivity by 10% in the mining operation and no decline in productivity in the more automated beneficiation plants. (Kronlund, 1974; Kjellgren, 1975).

‘In Swedish forest industries one-year follow-ups of the introduction of fixed wages in logging have been published. By and large these companies report a decline in severe accidents. In one case the total number of accidents decreased 10% but days lost through accidents were cut by 50%. (Domanverket, 1975). Both companies report productivity loss of about 10-15% but at the same time increased quality of work (SCA-tidningen, Nov. 26, 1975).

‘In a one-year follow up made by the present author and associates from a highly mechanized saw-mill the introduction of fixed wages showed no decrease in productivity. (Aronsson, 1976; Gardell, 1976). At the same time, the workers reported greater security, improved relations at the work-place and a smoother working rhythm. To a certain extent work was reported less hectic, but mental strain and monotony was not very much affected by the change in wage-system. This is explained by the fact that no changes were made in pace or production methods, a result well in line with our previous findings.

‘In summary, all these findings point to piece-rates being a factor with several negative aspects from the point of view of health and safety. Above all, piece-rates seem to induce an intensified working rhythm, a strong taking of risks and competition between individuals or teams. (Poyhonen, 1975). Obviously, piece-rates also may lead

to increased productivity but at a cost carried by the worker and the larger society.'

We have referred to the organizational changes which occurred at the Campbell Chibougamau Mine in 1975.²⁶ As part of a general reorganization, the company, in consultation with the union representing its employees, withdrew the individual production incentive scheme and placed production miners on a salary augmented by a mine-wide incentive. This incentive is based on a sharing of the savings achieved by meeting production targets at, or below, standard costs. It permits earnings up to 125 per cent of base.

Although other aspects of the reorganization, including the direct involvement of workers in the planning of their work and the extensive use of group leaders, doubtless impacted favourably on safety performance, we believe that the shift

Figure 1

**Compensable
Accidents/Million Man-Hours**

Year	Campbell Chibougamau Accident Frequency	Quebec Frequency* (Metal Mines)	
1972	16.0	15.2	
1973	15.9	17.7	
1974	9.7	19.5	
1975	15.7	23.6	
1976	3.7	27.4	} Post Reorganization
1977	5.5	27.4	
1978	10.0	22.9	
1979	9.9	28.2	

*Strasser, J.G., 'A Fresh Approach to Mine Organization and Incentive Planning at Campbell Chibougamau Mines Limited' *CIM Bulletin*, Volume 74, No. 826, February 1981, page 57.

²⁶ Strasser, J.G., 'A Fresh Approach to Mine Organization Incentive Planning at Campbell Chibougamau Mines Limited' *CIM Bulletin*, Volume 74, No. 826, February 1981, p. 57.

from individual production incentives is also a critical factor in the company's improved safety performance. This improvement is illustrated by a comparison of the company's accident frequencies for the years 1972-79 with the frequencies experienced in the Quebec metal mining industry.

We are advised that the Campbell Chibougamau Mine continued to enjoy the best accident frequency record for 1980 of any metal mine in Quebec.

An incentive system which rewards individual effort will improve productivity, as will a number of other management initiatives. However, the research which has been done, the Swedish, Campbell Chibougamau and Texasgulf experiences and fatality statistics in Ontario mines, support the conclusion that there is a substantial price to be paid in terms of worker safety. The incentive system may serve as a disincentive to the reporting of minor accidents. But it seems that there is a direct relationship between individual production incentive schemes and the severity of the accidents suffered by those working under such systems.

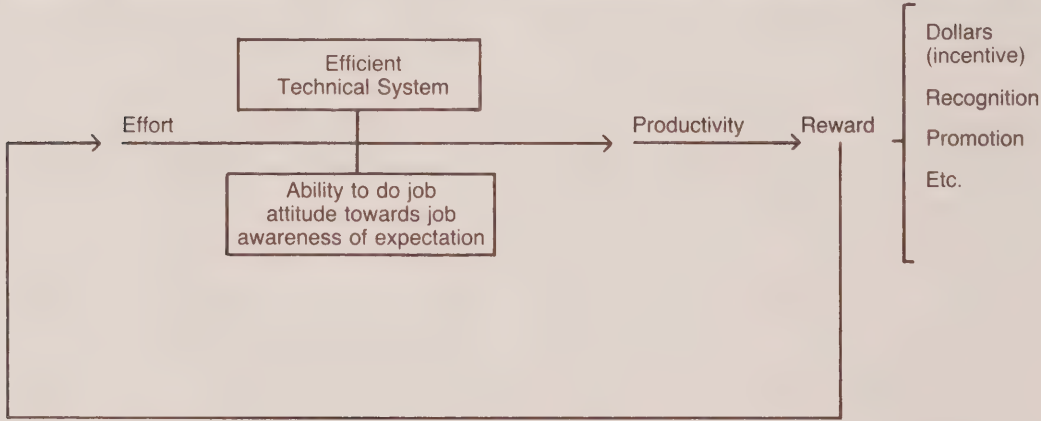
The implications for the Ontario mining industry are significant. The underground production miner works with explosives and heavy equipment in confined spaces and in, essentially, an unlit environment. The ground above and beside him is subject to failure or collapse. The miner must also be mindful of open holes. The mining environment, in contrast to a plant or factory setting, carries with it a more pronounced risk of serious accident. Yet the underground miner is paid under an incentive system which, the evidence suggests, contributes to the severity of accidents suffered by those working under such a system.

As noted, the incentive plans in place in most Ontario underground metal mines are designed to motivate the miner to work harder and longer than he otherwise would. There is a relationship between effort, productivity and rewards which has

been well documented by a number of researchers.²⁷ We have diagrammed this relationship (Figure 1), drawing on the Porter Lawler model (Porter, L.W. and Lawler III, E.E., *Managerial Attitudes and Performance*, R.D. Irwin, Homewood, Illinois, 1968).

To address the incentive issue in our model, it is necessary to assume that money is a major motivating force for miners in general. We believe this to be a valid assumption, although money is not the only motivating force, as some proponents of the incentive system would have us believe. We also assume, for purposes of our model, that productivity is to be achieved using standard work practices. Given these assumptions, the model shows that the greater the monetary incentive provided, the greater will be the effort exerted and the greater will be the resultant productivity. In theory, at least, the model shows that there should be no increase in accidents caused by the incentive.

Figure 2



²⁷ In order to achieve a better understanding of the behavioural implications of the incentive system and to determine if the conclusions supported by the empirical evidence are consistent with the behavioural theory, we retained A. Mikalachki, a professor of business administration at the University of Western Ontario, as a consultant to the Commission. Professor Mikalachki acts as a consultant to a number of large Canadian companies and is the author of *Group Cohesion Reconsidered*, and the co-author of *Management's View of Union-Management Relations at the Local Level*. He has also written numerous articles, 'There is no Merit in Merit Pay', which won the P.S. Ross Award in 1977.

However, there are three major contingencies that affect the effort, safe production and incentive relationship which supports the incentive scheme approach to motivating miners. The first deals with the miner's perception that an increased effort on his part will result in increased productivity. This perception depends upon the efficiency of the technical system (equipment, supplies, methods, ground conditions, etc.), the miner's ability to perform his job and his understanding of what is expected of him. These latter two variables relate directly to the selection criteria and training procedures which are in place. If the technical system operates at less than expected efficiency or if a miner is poorly trained or does not have the ability to do his job, increased effort will not be matched by commensurate performance. In these circumstances, the miner will become frustrated and he will either reduce his efforts or, as is more likely under the production incentive system, he will deviate from standard work practices in an attempt to maintain his income.

The second contingency affecting the model deals with the miner's perception that increased productivity will be equitably compensated. We were told by some miners that, as they increase productivity, incentive standards are tightened so that they must expend greater effort in future to maintain current levels of earnings. The companies, who retain sole discretion in the setting of standards, deny that this is the case. If the miner's perception is that standards are tightened, the result will be either a dampening of the miner's incentive to expend effort or a deviation from standard work practices in order to protect his earnings. If the miner perceives that increased productivity will be equitably compensated, the direct relationship between effort (within standard work practices), productivity and incentive will be maintained.

The third contingency, worker attitude, relates specifically to the operation of production incentive systems in underground mines where direct supervision is sporadic. Notwithstanding

the state of the technical system or the miner's level of competence, a miner with a poor attitude towards his work in general or towards safety in particular, may be predisposed to deviate from standard work practices in an attempt to earn a satisfactory reward more easily. This result is more likely to occur where the technical system is deficient or where the miner is otherwise frustrated in attaining production objectives. The lack of direct supervision in an underground work setting removes a major constraint on this type of behaviour.

The problems generated by a production bonus incentive system focus primarily on its dysfunctional side effects. The incentive system alone, handled by well-trained miners with positive attitudes toward their work, working in a technically efficient production system is a benefit, both to the miner and the company. This conclusion is consistent with the finding of many of the Ontario mining companies that the highest paid bonus-miners are the safest workers. The high bonus earner has a sound knowledge of his job, a good attitude and he works in an efficient technical system. He is often assigned to the best work areas. He is less likely to become frustrated and expose himself to undue risks. It is the less skilled or below average miners, burdened with more difficult work sites and lacking direct supervision, who produce less and experience higher accident and fatality rates.

We know that the technical system in a mining environment does break down. Labour scarcity and industry turnover rates suggest that, notwithstanding the common core modular training program, there are underground workers who do not possess full job capabilities. Moreover, miners experiencing financial or family problems may well be distracted from devoting full attention to their work. We have observed that an adversarial approach to health and safety matters can, and does, exist and that some managements have less than a total commitment to health and safety. These, and other factors can, and do, undermine worker attitude. Any one or a combination of these

impediments, when present in a system which ties earnings to individual productivity, but which lacks close supervision or other means of external control, can lead to behaviour modifications which may result in accident and injury.

The companies recognize that technical system failure may place undue pressure on an incentive-miner and have responded by permitting line supervision to adjust incentive contracts to take unexpected difficulties into account. But these adjustments cannot possibly take into account—nor are they intended to—all technical system failures, attitudinal and personal problems confronting individuals at any given time and shortcomings in crew make-ups that are a result of poor recruitment, selection or training.

If these difficulties could be removed from the system, the incentive bonus, in theory, should not be a factor in increasing the frequency and severity of accidents. However, the bonus system, which is used by mining companies as the primary motivator, serves to dull the forces pushing toward more direct and innovative management involvement. As importantly, many of the difficulties to which we have referred are either beyond the control of management or are chronically imbedded in the system. In these circumstances, it is our belief that attention must be given to finding an alternative to the individual production bonus as a means of compensating underground miners. The fact that time to perform safety functions is built into the standard hour incentive plan does not alter this conclusion. This is so because the open-ended reward is based on output and, in the absence of direct supervision, the time which should be taken to perform safety functions may be used to increase output.

In addition to the behavioural implications, the direct individual productivity incentive system carries with it a number of

other undesirable side effects. In the course of our investigation, we have identified five of these. The bonus system:

- distorts the normal salary relativities found in most manufacturing or processing organizations. An above average bonus-miner is capable of earning more than his immediate supervisor, with the result that the promotion of competent and experienced miners into supervisory ranks is inhibited and the status of the first line supervisor is less than it should be. We were advised that many of the companies utilizing the standard hour incentive plan have experienced difficulty in recruiting first line supervisors because of this and, admittedly, because of other reasons.
- restricts the supervisor's flexibility to assign his most experienced and competent miners to the most difficult work areas. Competent and experienced miners expect to work in areas which have the potential for maximum earnings and are assigned these areas where possible. The flexibility of the supervisor in assigning crews is diminished with the result that less experienced and less competent miners are often assigned to work in more difficult areas. The safety implication is obvious.
- limits the willingness of competent and experienced miners to assist with the on-the-job training of new recruits. The time taken to assist and instruct is time away from activities which will increase short-term incentive earnings. The production incentive system will inhibit the experienced miner from taking on a shared responsibility for performance and safe working practices. Since there is no extrinsic reward for such a helpful relationship, and since the experienced miner may even have to pay a price under the production incentive system, the less experienced miner is at a greater disadvantage than he otherwise would be. The emphasis

on the money reward for production has the effect of motivating the miner to perform only those duties which directly affect his immediate pay-off.²⁸

- contributes to the breakdown of equipment and machinery used to earn incentive. Some operators on incentive will be predisposed to disregard safety checks and will be inclined to continue to operate equipment which exhibits mechanical defects in order to protect incentive earnings. The result is to increase the cost to the company of doing business and to increase the risk of accident to workers.
- conveys to the miner a certain lack of long-term commitment to him. The incentive plan rewards maximum physical effort over a series of fixed periods without regard for the long-term effects. So long as a miner can put out the effort necessary to maximize production, he will be rewarded. However, if he is unable to maintain his pace over the long-term, his standard of living will suffer. The bonus plan increases the normal stress upon the middle-aged or older worker whose physical capability has diminished, perhaps in part because of his past efforts to earn maximum incentive payments. The result may be to cause the older worker to deviate from standard work practices in order to maintain his earnings. Furthermore, the incentive scheme has a tendency to inhibit the younger worker from making a long-term commitment to his occupation and to his company, thereby making it more difficult to bolster a positive work attitude. In this regard, the standard

²⁸ This conclusion is supported by research which shows that extrinsic rewards such as money reduce the intrinsic motivation of workers. See Deci, E.L. *Paying People Doesn't Always Work the Way You Expect It To* Human Resource Management Vol 12 (Summer 1973), pp. 28-32.

hour incentive plan can be seen as a factor contributing to worker turnover at a time of projected labour shortages and escalating training costs.

We are compelled to note that Texasgulf, the industry leader in safety performance, is not burdened by any of these counterproductive effects of the individual production incentive system.

The only evidence available to us which suggests that individual productivity incentive plans may not be a major contributing factor to the severity and frequency of underground accidents is the recent experience of the National Coal Board in England. Towards the end of 1977, the coal board introduced an incentive scheme based on a standard task per man-shift with an incentive payment made for any performance in excess of 75 per cent of the standard task. Prior to the implementation of this incentive system, a national day-wage structure had been in place. It has been found that the introduction of the incentive system has not influenced the long-term downward trend in accident rates which has been experienced over many years. It is important to note that under the plan, coalface workers have the option of being paid the average of all coalface incentive earnings at the mine or the incentive earnings for their particular face. We are advised that approximately 53 per cent of coalface workers are paid incentive on the basis of the average of all faces in the mine, a type of mine-wide incentive. Under the coal board incentive system, miners earn an average of 35 per cent of base rate. The British place considerable emphasis on ensuring that the miners have proper and well-maintained tools and equipment, as is reflected by the fact that maintenance workers receive from 65 to 100 per cent of the incentive of the face crew. The British also make extensive use of group leaders.

Notwithstanding the British experience since 1977, we are satisfied from all of our inquiries that there is a relationship between the standard hour incentive plans which are in effect

in most Ontario mines and the number and severity of accidents which occur in these mines. We do not dispute that this method of compensation is a useful tool in maintaining productivity at acceptable levels. But we do not believe that such a method of compensation is required to maintain productivity at acceptable levels.

Firstly, the level of productivity which might exist in the absence of a standard hour incentive plan will be determined—to the extent that productivity is dependent upon the method of worker compensation—by the method and level of compensation which is established in its place. We are confident that methods can be devised which will motivate workers to maintain productivity levels within existing wage-cost parameters, viz.—Texasgulf, Algoma Ore and Campbell Chibougamau.

Secondly, worker productivity is affected by a whole range of initiatives which are independent of incentive compensation. It appears to the Commission that adherence to the standard hour incentive scheme by management and labour in the industry has blunted whatever impetus may otherwise have existed to adopt more progressive means of motivating workers. Management and unions will be forced to re-think their traditional approaches to employee motivation as they consider moving away from the standard hour incentive scheme.

Thirdly, productivity is a function of both output and cost. Long-term cost savings may well accrue as a result of discontinuing the individual productivity incentive scheme. The costs associated with administering the plan will disappear, the costs associated with the misuse of supplies and the abuse of equipment will be reduced and the costs associated with the accidents which are prevented because of the plan's discontinuance will be avoided. Although the standard hour incentive plan results in a satisfactory level of productivity, discontinuance

of the plan would not necessarily result in an unsatisfactory level of productivity.

It is also argued that the standard hour incentive plan is needed to attract and retain competent miners. Texasgulf has the lowest turnover rate in the Ontario mining industry and it is our information that Campbell Chibougamau has the lowest turnover rate in the Quebec mining industry. Neither company has experienced difficulty in attracting and retaining miners and yet neither pays an individual production incentive bonus. In any event, we are not convinced that if the standard hour incentive plans were to be discontinued within the industry and replaced by an acceptable alternative, there would be a significant flow of labour from individual firms or from the industry.

The mine-wide incentive plans which are in effect at Algoma Ore, Campbell Chibougamau and at INCO's McCreedy West Mine do not operate on the basis of a direct relationship between an individual's productivity and his earnings. The incentive relationship is between mine-wide productivity and the earnings of everyone in the operation. The first two of these provide for incentive earnings in the order of from 20 to 25 per cent of base earnings while the third provides incentive earnings of upwards of 50 per cent of base earnings. Given the long history of individual bonus plans and their general acceptance by miners and their unions, it may well be that a move to a mine-wide incentive plan would be a reasonable and acceptable alternative. However, the Commission believes that as the percentage of earnings dependent upon productivity increases, so will risk-taking increase. If mine-wide incentives are to be introduced, the Commission believes that the percentage of earnings dependent upon productivity should not be permitted to exceed 25 per cent of base earnings.

Although the unions appearing before us suggested that current incentive plans were a factor contributing to accidents in

Ontario mines, their recommendations for change appeared to be motivated by internal politics rather than by safety considerations. The unions propose that the basic structure of the standard hour plan remain intact but that the time allowances for performing safety-related functions be increased. This proposed solution, although acceptable to the miners who are attracted to the higher potential earnings which the proposal offers, fails to address the fundamental safety-related deficiency of the standard hour plan. There is no reason to challenge the assertion of the companies that sufficient time is already provided for safety-related functions. Increasing these times would simply increase the earnings potential of those working under the plan, without in any way removing the features which cause some miners to increase their exposure to risk in order to maximize potential earnings.

It was clear, at least at the time of the Commission's hearings, that the companies which compensate on the basis of the standard hour plan were not prepared to replace it with an alternative system on their own volition. It was equally clear that the unions representing miners working under the standard hour plan would not push for meaningful change. However, having regard for all of our inquiries, we are convinced that change is required.

Since collective bargaining in the industry takes place at the local level, this is the level at which changes will have to be worked out and implemented. Levels of compensation in the industry are not the Commission's concern. But we are vitally concerned when the method of compensation impacts unfavourably on safety performance. The parties at the local level, with whatever assistance is available from higher levels, must put their minds to developing an alternative to the standard hour incentive plan which will minimize the incidence

of risk taking and, at the same time, maintain productivity at acceptable levels. We believe that this result can be achieved if:

- consideration is given to instituting grades within each classification for the purpose of providing a level of fixed or base remuneration based on an individual's assessed level of performance. The new recruit would be placed in an entry-level grade, the average worker would be placed in a working-level grade and the exceptional worker—the current high bonus earner—would be placed in an advanced-level grade. Progression from the working-level to the advanced-level would be on the basis of assessment by the company with some agreed percentage of the mining population assigned to the level at any one time.
- consideration is given to an incentive scheme based on mine-wide performance (costs and/or output) which pays up to 25 per cent of base earnings. This approach, although a less radical departure from the *status quo* than other satisfactory alternatives, removes much of the incentive for the individual miner to engage in risk-taking. His income is no longer directly tied to his individual level of production over a relatively short period of time. In addition, the capped mine-wide approach maintains a direct relationship between wage costs and overall productivity.
- consideration is given to maintaining the current level of overall, as distinct from individual, earnings of those on the standard hour incentive plan for various levels of production. This would require an increase in the current base rates and a schedule of payouts under a capped mine-wide incentive scheme which would provide for the maintenance of roughly equivalent overall earnings.

Having regard to all of the foregoing, we recommend:

that individual mining companies and their respective unions agree to discontinue individual (or small crew) production incentive plans.

Given a spirit of co-operation and the knowledge that a change is required, we are hopeful that the mining companies and the unions representing their employees will design and agree to satisfactory alternatives to the standard hour incentive plan. However, if we are mistaken in our assumptions and if, for whatever reason, management and labour are unable or unwilling to discontinue the standard hour incentive plan, government intervention will be necessary. Safety considerations dictate that direct individual productivity incentive schemes not be allowed to operate in Ontario mines. Accordingly, we recommend:

that government make known its intention to legislate an end to direct individual (or small crew) production incentive plans in Ontario mines if these plans are not voluntarily discontinued.

Conclusion

Conclusion

The human element is the critical variable in accident prevention. In framing recommendations, we have been governed by the need to strengthen the commitment to safe production by those responsible for the performance of work, and by the need to improve the quality of the relationships between those who are either directly or contributively responsible for safe production. Our confidence in the ability of the direct and contributive participants is reflected in the fact that very few of our recommendations call for immediate legislative action. Implementation of the many other recommendations require voluntary action by, and corresponding co-operative responses from, the individual participants.

In directing recommendations to the participants—management, labour and government—and in relying on their initiative for implementation, an opportunity has been created which should not be missed. Each of the participants has been given the opportunity to demonstrate a commitment to safe production by moving in the collaborative directions we have suggested. If the participants seize this opportunity, a dynamic will be established which will carry the industry forward. However, if either mining companies, unions, the safety association or government fail to follow through, the opportunity will be lost. The result will be the erosion of much needed trust and the creation of unwanted tensions. The basic characteristics of a comprehensive and smoothly functioning safety system—commitment, involvement, openness and co-operation—will be more difficult to achieve.

We expect the participants to take advantage of the opportunity which has been presented. However, we would be remiss if we did not suggest that a subsequent review be carried out for the purpose of assessing the implementation and impact of our recommendations. Furthermore, the Commission has been told, and it became evident to us, that both this inquiry and

the Ham Inquiry have impacted positively on those with direct and contributive responsibilities for safe production. As the hearings progressed, this conviction strengthened. It was acknowledged by several who made submissions to us that the Ham Inquiry of six years ago and this inquiry prompted all participants to re-examine their own roles, responsibilities and behaviour in regard to safety. It is our view that the public inquiry process, in itself, can, and does, play a significant role in bringing about reassessments which will lead to improvements. Accordingly, we recommend:

that a follow-up inquiry into the adequacy of safety practices and arrangements in Ontario mines and mining plants be undertaken commencing within three years of the release of this report.

Appendices

Appendix 1

Letter and List of Subject Matters to be addressed before the Commission as sent to Ontario Mining Companies and Local and National Unions Representing Workers in the Ontario Mining Industry.



Joint Federal - Provincial Inquiry
Commission into Safety in Mines
and Mining Plants in Ontario

434 University Avenue
5th Floor
Toronto, Ontario
M7A 1T7

August 25, 1980

In response to an increased number of worker fatalities as a result of accidents in the Ontario mining industry (20 to date in 1980), a Joint Federal-Provincial Inquiry into Safety in Mines and Mining Plants in Ontario was announced on July 8, 1980. The Inquiry is a joint Federal-Provincial undertaking in order to permit a review of safety arrangements and practices in the entire Ontario mining industry, including uranium mines and uranium plants which are under Federal jurisdiction. The Commission has the authority to summon and enforce the attendance of witnesses and to enter any premises where work is being done in connection with any matter referred to it. Our Inquiry does not extend to matters of occupational health. I was named to chair the inquiry Commission, and Mr. Keith Rothney, the Chairman of the Safety and Health Committee of Local 6500 of the United Steelworkers of America in Sudbury, and Mr. Peter Riggan, the Senior Vice President, Corporate Relations, of Noranda Mines Limited were named as members. Both the Federal and Provincial Ministers of Labour have expressed a desire to have the Commission's final report by the end of the year.

- 2 -

It is our intention to hold public hearings in order to provide interested individuals and organizations with an opportunity to make submissions on matters relating to safety in mines and mining plants in Ontario. Subject to the need to hold additional days of hearings in any of the locations listed below, hearings will commence as follows:

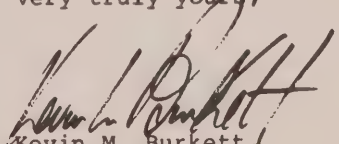
Sudbury	September 16 & 17	9:30 a.m.	Holiday Inn Paladium North Room
Elliot Lake	September 23 & 24	9:30 a.m.	Algo Inn Algoma Room
Timmins	October 1 & 2	9:30 a.m.	Senator Motor Hotel Ballroom B
Thunder Bay	October 7 & 8	9:30 a.m.	Red Oak Inn Oak Room
Toronto	November 18 to 21	9:30 a.m.	Bond Place Hotel Picadilly Room

By holding hearings in Northern Ontario, we hope to encourage representations from individual workers, local unions and resident management. The hearings scheduled for Toronto are designed to afford interested agencies of government, trade and safety associations, parent trade union bodies and mining company corporate offices the opportunity to make submissions. In order to assist those interested in making submissions, and in order to solicit relevant information, a list of subject matters which are of interest to the Commission is enclosed. We are requesting that all written submissions be submitted at least seven days prior to the hearing date.

If you wish to appear before the inquiry please contact:

The Office of the Inquiry Commission
into Mine Safety,
434 University Avenue - 5th Floor,
Toronto, Ontario
M7A 1T7

Very truly yours,


Kevin M. Burkett,
Chairman

Some Subject Matters to be Addressed

Three broad categories with subheadings under each are set out below. The subject matters listed below are not all-inclusive. It is our expectation that persons or organizations with an interest in this inquiry will bring other factors to our attention which may have an impact on safety in mines and mining plants in Ontario.

A) The Workplace

How does the employer ensure the safest possible workplace?

1) *Engineering*

In particular we ask that the safety component of engineering work done, including research, in connection with:

- ground control/rock mechanics
- mine and plant layout
- production processes
- equipment design

be described and the adequacy or inadequacy be addressed.

2) *Acquisition of Machinery, Equipment, and Services*

What attention is given to worker safety in acquiring machinery and equipment? in engaging mining contractors? in engaging construction contractors?

3) *Protective Equipment*

What is the adequacy and utilization of protective equipment presently available and/or in use in mines and mining plants?

B) Work Practices

How are safe work practices ensured in the workplace?

1) *Employer's Safety Organization*

How is the employer organized to promote safe work practices? In particular, we ask that safety responsibility centres be identified, that the line – staff differentiation be made clear and that the authority given to those responsible for maintaining and enforcing internal company safety standards be described.

What safety responsibilities are vested in and exercised by the first line supervisors?

2) *Training*

To what extent are employees trained by the employer in matters of safety? In particular, we ask that the type, frequency, and duration of safety training given to:

- new employees
- existing production employees

- supervisors
- safety staff

be described. What proportion of the employees in each of the above categories has had the benefit of the training described? How effective is the training given to each employee group in promoting a safe workplace?

- b) If the production employees are represented by a trade union, what safety training is offered by the union – (type and frequency) and what proportion of union-represented employees has had the benefit of this training?
- c) Are there joint union-management safety training programmes in place?

3) *Health and Safety Committees*

How are they structured, how do they operate and what impact do they have on safety within the workplace? In particular, we ask that the responsibilities as between supervisors and committee be described.

4) *Method of Payment to Employees*

Where are production bonus systems in effect (number of employees covered and type of work performed)? How do they operate? What effect, if any, does a bonus system of payment have upon safety in the workplace?

5) *Investigation and Record Keeping*

Are accident investigation methods and record keeping adequate for the purpose of identifying hazardous work areas and dangerous work practices?

6) *Communication*

Describe the safety communications network as it exists in the employer's organization.

C) External Environment

How can the external environment be structured to best facilitate safety in the workplace?

1) *Health and Safety Legislation*

Is the existing legislation adequate to ensure the safest possible workplace and to ensure that safe work practices are followed?

2) *The Mine Safety Inspection Branch*

How is the role of the branch (field and head office) perceived, and is it adequately and effectively carrying out its own role under the legislation?

3) *Labour Relations System*

What effect, if any, does the adversarial system of labour relations have on the ability of the parties to promote and maintain the safest possible workplace?

4) *Information Base*

Is sufficient information maintained by government to facilitate the monitoring and evaluation of mine safety policy?

5) *Industry Associations and Union Parent Organizations*

What role do these organizations presently play in the safety system? What is the appropriate role for these organizations in the promotion and maintenance of safety in the workplace?

Appendix 2

Briefs and Presentations to the Inquiry Commission

Place/Date	Exhibit	Organization/Individual
<i>Sudbury</i>		
Sept. 16/80	1.1	Ontario Mining Association
Sept. 16/80	1.2	Ontario Mining Association Supplementary statement by the President of the association
Sept. 16/80	1.3	Mr. Zymond Najgebauer Motorman INCO (Individual)
Sept. 16/80	1.4	Mr. E. Nitchie Sudbury Mine Mill and Smelter Workers Union
Sept. 16/80	1.5	Mr. N. Oglestone Occupational Safety, Health and Environment Committee, Stobie Mine, Local 6500 United Steelworkers of America
Sept. 16/80	1.6	Mr. D. Jeffrey Occupational Safety, Health and Environment Committee, Stobie Mine, Local 6500 United Steelworkers of America
Sept. 16/80	1.7	Inco Metals Company, Ontario Division

Place/Date	Exhibit	Organization/Individual
Sept. 16/80	1.8	Mr. R. Fortin Inquest Committee, Local 6500 United Steelworkers of America
Sept. 16/80	1.9	Mr. B. McKeigan Occupational Safety, Health and Environment Committee, Copper Cliff Refinery, Local 6500 United Steelworkers of America
Sept. 16/80	1.10	Mr. G. Smith Special Incentive Committee, Local 6500 United Steelworkers of America
Sept. 17/80	2.1	Mr. V. Ramsay Occupational Safety, Health and Environment Committee Executive, Local 6500 United Steelworkers of America
Sept. 17/80	2.2	Mr. Doug Marion – Bonus Miner (Individual)
Sept. 17/80	2.3	Mr. C. Mattson Occupational Safety, Health and Environment Committee Co-Chairman Copper Cliff South Mine Local 6500 United Steelworkers of America

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Place/Date	Exhibit	Organization/Individual
Sept. 17/80	2.4	Falconbridge Nickel Mines Limited
Sept. 17/80	2.5	Mr. John Higginson, (Individual) Former Chairman Inquest Committee, Local 6500
<i>Elliot Lake</i>		
Sept. 23/80	3.1	Mr. Paul Falkowski Statement on Drugs and Alcohol United Steelworkers of America
Sept. 23/80	3.2	Mr. Ed Vance Health and Safety Committee Chairman, Local 5762 United Steelworkers of America
Sept. 23/80	3.3	Mr. Joe Roch Staff Representative, Locals 5417 and 8626, United Steelworkers of America
Sept. 23/80	3.4	Mr. R. Dube Health and Safety Committee Member, Local 5762, United Steelworkers of America

Place/Date	Exhibit	Organization/Individual
Sept. 23/80	3.5	Mr. A. Kanabe Health and Safety Committee Chairman, Local 5417 United Steelworkers of America
Sept. 23/80	3.6	Mr. J. Scott Health and Safety Committee Office and Technical, Local 5815 United Steelworkers of America
Sept. 23/80	3.7	William Stewart (Individual) Member, Local 5417
Sept. 23/80	3.8	Mr. D. Mellor President, Local 5762 United Steelworkers of America
Sept. 23/80	3.9	Mr. R. Cayen Health and Safety Committee Member, Local 5762 United Steelworkers of America
Sept. 23/80	3.10	Mr. D. Kenehan Health and Safety Committee Member, Local 5762 United Steelworkers of America

Place/Date	Exhibit	Organization/Individual
Sept. 23/80	3.11	Mr. H. Sequin Staff Representative, Local 5762 United Steelworkers of America
Sept. 23/80	3.12	William Snow (Individual)
Sept. 23/80	3.13	Mr. Glen Thornton Health and Safety Committee Member, Local 5762 United Steelworkers of America
Sept. 23/80	3.14	Denison Mines Limited
Sept. 23/80	3.15	Rio Algom Limited Statement by P.A. Carloss, Vice-President & General Manager, Elliot Lake Operations
Sept. 23/80	3.16	Mr. E. Isaac Chief Engineer, Mining Health and Safety Branch Ontario Ministry of Labour

Timmins

Oct. 1/80	4.1	Mr. T. Pirie Local 7580 United Steelworkers of America
Oct. 1/80	4.2	Pamour Porcupine Mines Limited

Place/Date	Exhibit	Organization/Individual
Oct. 1/80	4.3	Kerr Addison Mines Limited
Oct. 1/80	4.4	Dome Mines Limited
Oct. 1/80	4.5	Texasgulf Canada Ltd.
Oct. 1/80	4.6	Mr. J. Bunclark Local 6896 United Steelworkers of America

Thunder Bay

Oct. 7/80	5.1	Mattabi Mines Limited
Oct. 7/80	5.2	Campbell Red Lake Mines Limited
Oct. 7/80	5.3	Noranda Mines Limited, Geco Division
Oct. 7/80	5.4	Mr. Peter Curtis Canadian Union of Base Metal Workers (C.N.T.U.), Representing workers at Noranda Mines, Geco Division
Oct. 7/80	5.5	Mr. W. Strong Chairman, Safety and Health Committee Local 8126 United Steelworkers of America

Place/Date	Exhibit	Organization/Individual
Oct. 7/80	5.6	Mr. D. Martin President, Local 8533 United Steelworkers of America
Oct. 7/80	5.7	Mr. H. Gareau Staff Representative, District 6, United Steelworkers of America
Oct. 7/80	5.8	Algoma Ore Division, The Algoma Steel Corporation Limited
<hr/> <i>Toronto</i> <hr/>		
Nov. 18/80	6.1	Mr. Peter Curtis Canadian Union of Base Metal Workers (C.N.T.U.) (2nd brief)
Nov. 18/80	6.2	Laszlo Gyongyossy (Individual)
Nov. 18/80	6.3	Dr. D.G. Hedley Canada Centre for Mineral and Energy Technology (C.A.N.M.E.T.)
Nov. 19/80	7.1	Mr. Paul Falkowski District 6, United Steelworkers of America
Nov. 19/80	7.2	Labour Canada

Nov. 20/80	8.1	Ministry of Labour
Nov. 21/80	9.1	Mines Accidents Prevention Association of Ontario (M.A.P.A.O.)
Nov. 21/80	9.2	Ontario Mining Association (2nd brief)

Elliot Lake

Nov. 24/80	10.1	Rio Algom Limited
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Sudbury

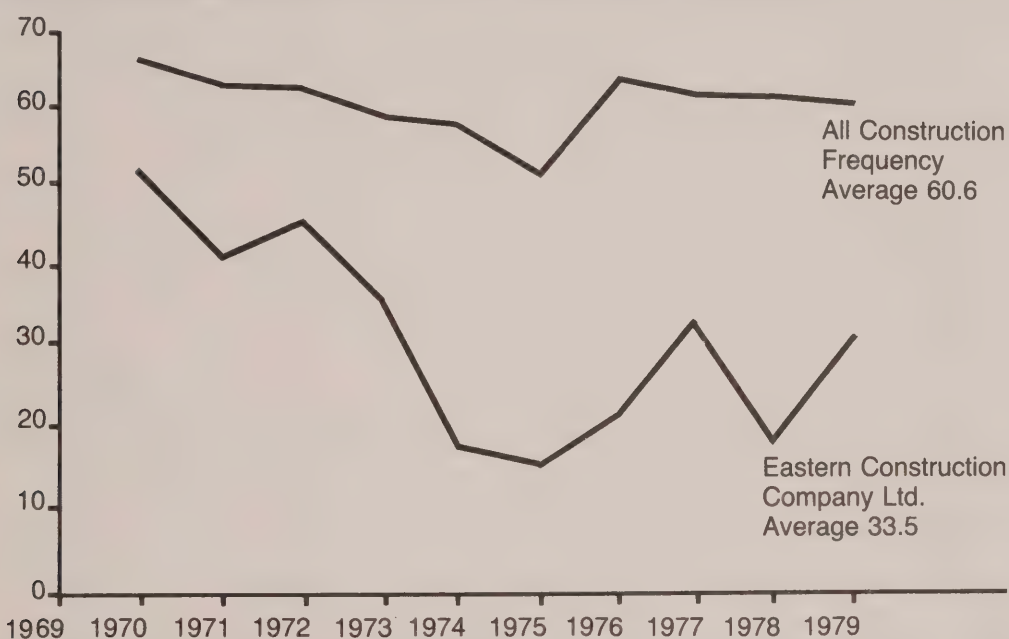
Nov. 26/80	11.1	Inco Metals Company, Ontario Division (2nd brief)
Nov. 26/80	11.2	Occupational Safety Health and Environment Committee Statement by Mr. Norman Ogglesstone Local 6500 United Steelworkers of America
Nov. 26/80	11.3	Jack Gignac (Individual) Bonus Miner Falconbridge Nickel Mines

Appendix 3

Graphs depicting the accident frequencies of superior performing companies relative to their respective industry averages.

Appendix 3(1)

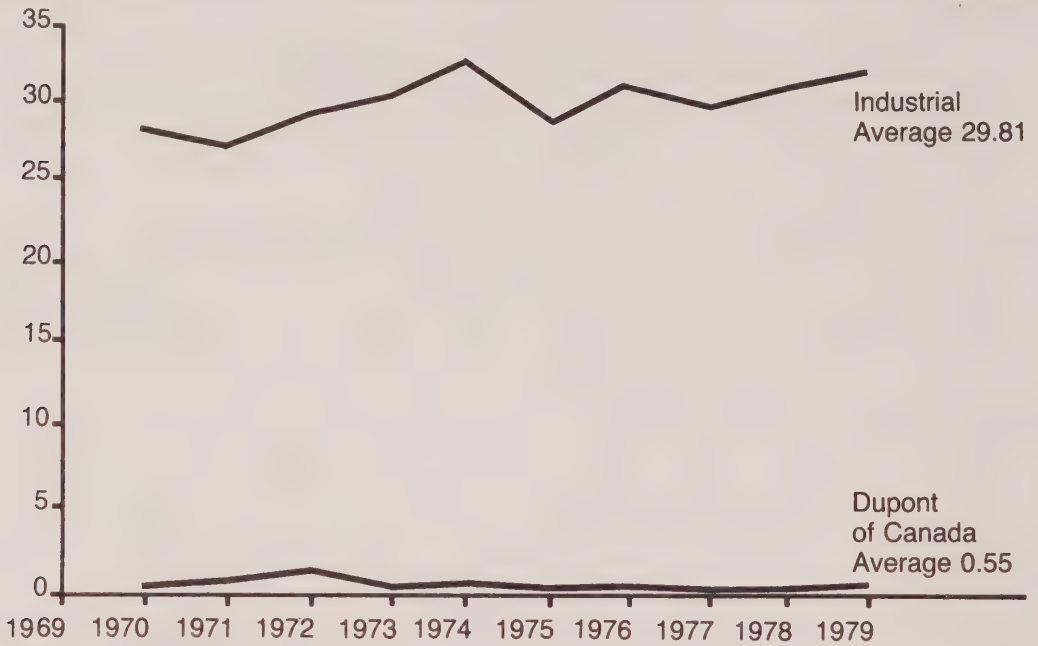
**Lost Work Time Injury Frequency/Million Man-hours
Construction Average and Eastern Construction Company Ltd.**



Source: Joint Federal-Provincial Inquiry Commission into Safety in Mines and Mining Plants in Ontario.

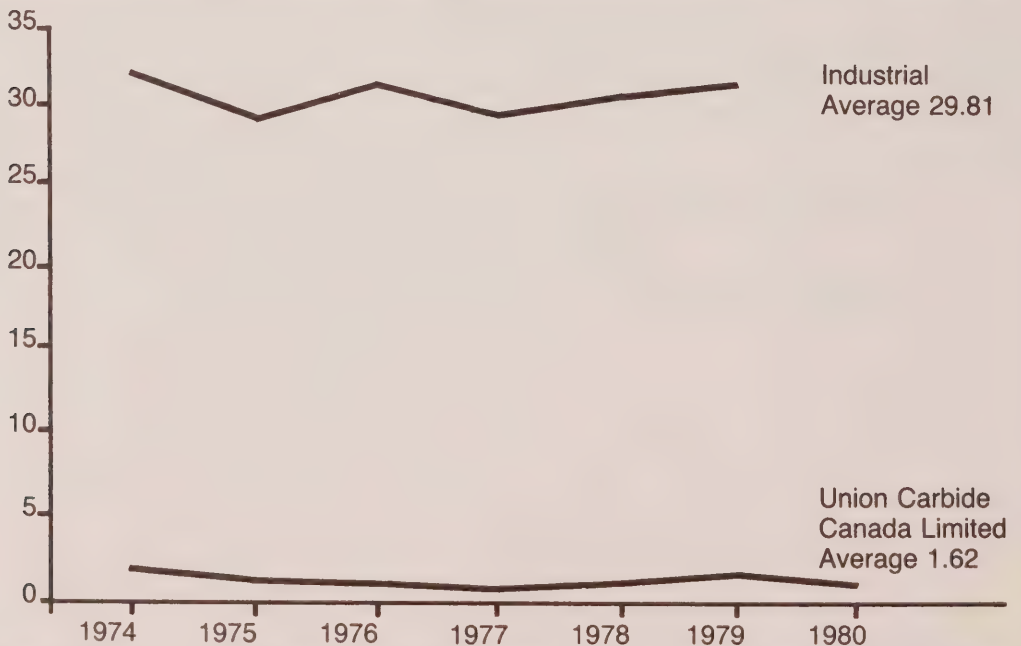
Appendix 3(2)

Lost Work Time Injury Frequency/Million Man-hours Industrial Average and Dupont of Canada Limited



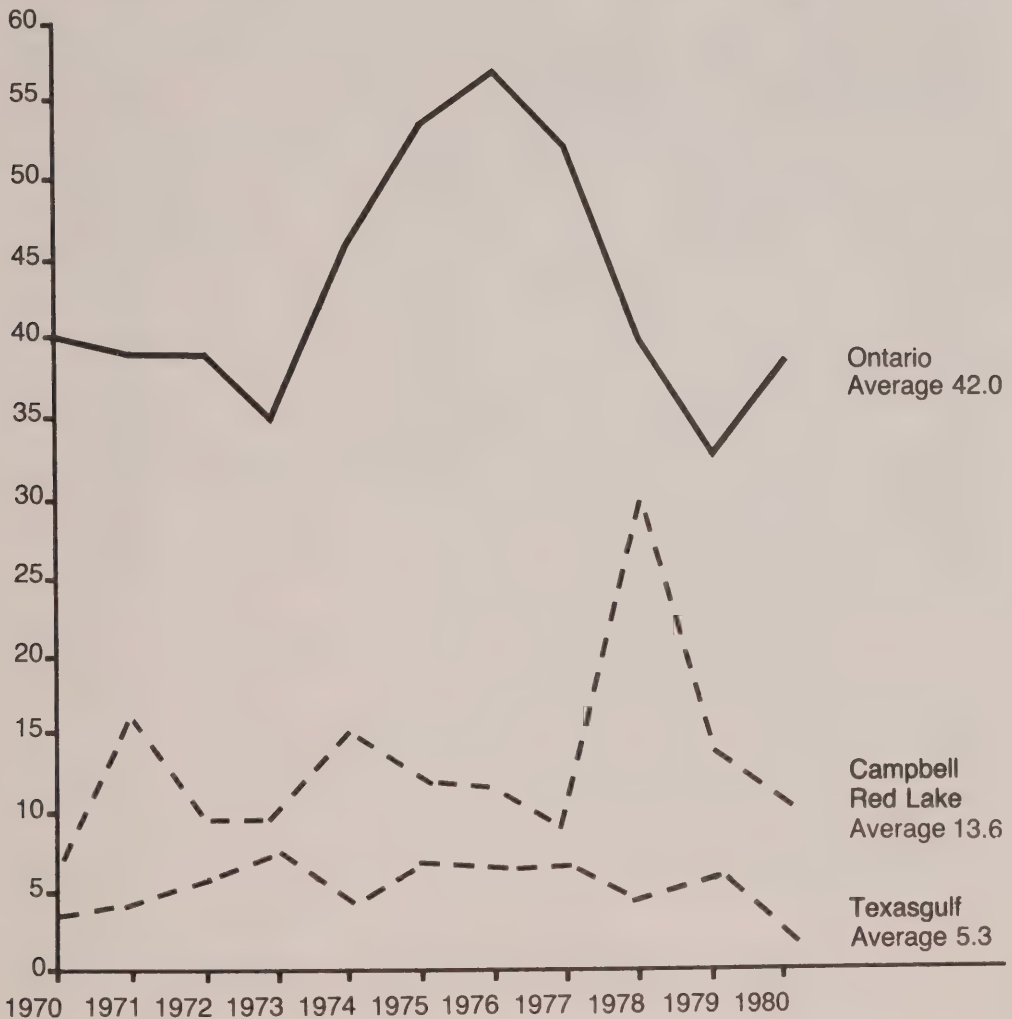
Appendix 3(3)

Lost Work Time Injury Frequency/Million Man-hours Industrial Average and Union Carbide Canada Limited



Appendix 3(4)

Lost Work Time Injury Frequency/Million Man-hours—Mining Average and Campbell Red Lake Mines Limited and Texasgulf Canada Ltd.



Source: Joint Federal-Provincial Inquiry Commission into Safety in Mines and Mining Plants in Ontario.

Appendix 4

Safety performance of the Ontario mining industry and comparisons with other jurisdictions.

Appendix 4(1)

Employment and Lost-Time Injuries in Ontario Mines^(a) (1969-80)

Year	Millions of Man-hours Worked	Number of Lost Time Injuries ^(b)	Rate (Injuries Per Million Man-hours)
1969	76.7	3,444	44.9
1970	84.8	4,152	49.0
1971	89.6	3,665	40.9
1972	78.6	3,281	41.7
1973	72.1	3,719	51.8
1974	74.9	4,615	61.6
1975	76.8	5,257	68.5
1976	80.0	5,749	71.9
1977	75.8	5,082	67.0
1978	62.4	3,527	56.5
1979 ^(c)	57.3	2,476	43.2
1980 ^(d)	56.6	3,675	65.0

Source: Exhibit 8.1 Ontario Ministry of Labour.

Data Source: Ontario Workmen's Compensation Board.

a) Includes mines, mining and metallurgical plants and contract diamond drilling,

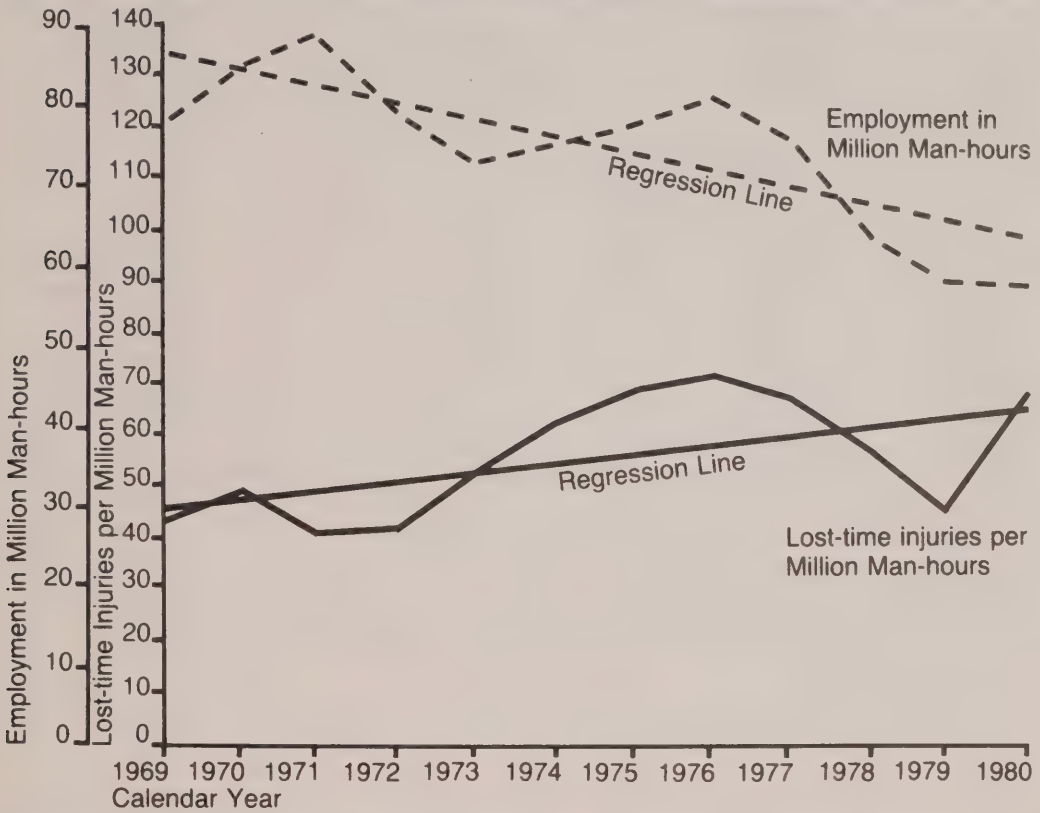
b) Includes disabling industrial diseases.

c) Provisional data.

d) Estimated data for the first ten months of 1980.

Appendix 4(2)

Employment and Lost Time-Injuries in Ontario Mines 1969-1980



Source: Exhibit 8.1 Ontario Ministry of Labour.

Data Sources: Workmen's Compensation Board files for rate nos 069, 076, 084, 091, 095, 098, 100, 109, 365, 968.

Notes: Lost-time injuries include disabling industrial disease.

Date for 1978 are provisional and data for 1980 are for 10 months only.

Appendix 4(3)

Employment and Accidental Fatalities in Ontario Mines^(a) (1969-80)

Year	Millions of Man-hours Worked	Number of Fatalities	Fatalities Per Million Man-hours
1969	76.7	21	0.27
1970	84.8	24	0.28
1971	89.6	26	0.29
1972	78.6	13	0.17
1973	72.1	12	0.17
1974	74.9	17	0.23
1975	76.8	10	0.13
1976	80.0	22	0.28
1977	75.8	13	0.17
1978	62.4	12	0.19
1979	57.3 ^(b)	9	0.16
1980 ^(c)	56.6	18	0.32

Source: Exhibit 8.1 Ontario Ministry of Labour.

Data Source: Man-hours data – Workmen's Compensation Board, fatalities – Mining Health and Safety Branch.

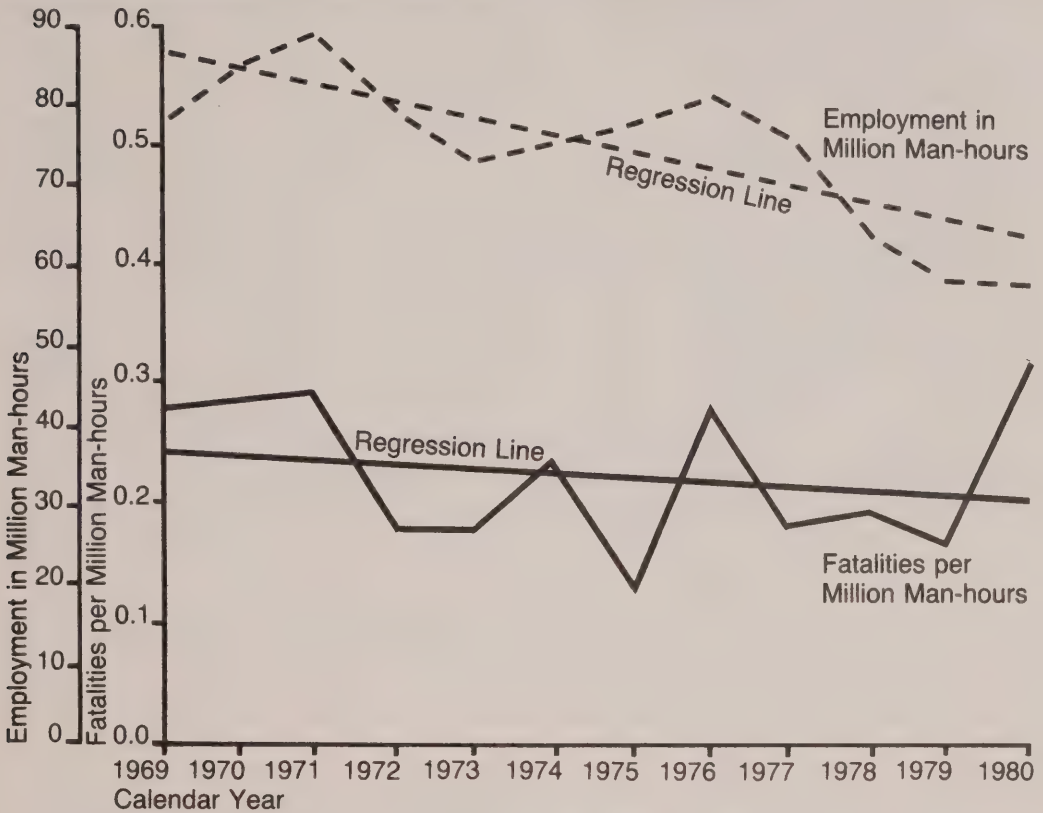
a) Includes mines, mining and metallurgical plants and contract diamond drilling.

b) Provisional data.

c) Estimated data for the first ten months of 1980.

Appendix 4(4)

Employment and Accidental Fatalities in Ontario Mines 1969-1980



Source: Exhibit 8.1 Ontario Ministry of Labour.

Data Source: Workmen's Compensation Board employment data & Mining Health and Safety Branch fatality records.

Provisional data for 1979 and estimated data for 10 months of 1980.

Appendix 4(5)

Fatality Statistics — Ontario Mines 1980

	No.	% Age
No. of Fatalities (a)	19	
No. of Women Killed	1	5.3%
No. of Men Killed	18	94.7%
No. Underground	15	79.0%
No. Employed by Contractors	5	26.3%
No. on Incentive	12	63.2%
Average Age	39.8	
Average Experience in Industry	143 mos.	
No. who had Modular Training	5	26.3%
No. of Foremen	4	21.1%
No. Killed on Day Shift	16	84.2%
No. Killed in the Morning	11	57.8%

Source: Joint Federal-Provincial Inquiry Commission into Safety in Mines and Mining Plants in Ontario.

(a) Fatalities at Mines and Mining Plants but excluding fatalities at Pits and Quarries.

Appendix 4(6)

Fatal Injury Rates in Mining – Ontario and Other Jurisdictions

Year	Ontario ¹	Other Provinces					Other Countries		
		British ¹ Columbia	Manitoba ²	Quebec	New ¹ Brunswick	Britain ³	Sweden ¹	U.S.A. ⁴	
1969	0.27	0.33	0.39	0.24	0.0				
1970	0.28	0.44	0.37	0.28	0.42				
1971	0.29	0.21	0.75	0.25	0.0				
1972	0.17	0.79	0.53	0.25	0.92				
1973	0.17	0.23	0.67	0.27	0.21				
1974	0.23	0.54	0.13	0.42	0.11		0.68	0.36	
1975	0.13	0.27	0.59	0.27	0.89	0.15	0.25	0.26	
1976	0.28	0.61	0.14	0.15	0.36	0.12	0.64	0.25	
1977	0.17	0.26	0.76	0.24	0.0	0.10	0.77	0.30	
1978	0.19	0.14	0.18	0.15	0.0	0.16	1.10	0.29	
1979	0.16	0.14			0.0	0.11	0.48	0.24	
1980	0.32					0.10			

Source: Exhibit 8.1 Ontario Ministry of Labour.

Data Source: Ontario – Mining Health and Safety Branch records; British Columbia – The Mining Assoc. of Br. Columbia; Manitoba – Mining Engineering and Inspection Branch; Quebec – Report on Safety and Health in the Metallic Mining Industry in Manitoba, 1979; New Brunswick – Mines Safety Branch; Britain – National Coal Board; Sweden – obtained by MHSB from Swedish industry officials; U.S.A. – MHSB calculation from data reported in *Mine Safety & Health*; U.S. Dept. of Labour, March-April, 1980.

1. Includes all underground and open pit mines, mining and metallurgical plants and diamond drilling – excludes pits and quarries included.
2. As in (1) above except that pits and quarries included.
3. Coal mining only.
4. Metal and non-metal miners – excludes coal mines, pits and quarries.

Appendix 5

Compendium of Recommendations

The Chief Executive Officer

that the chief executive officer of each mining company operating in Ontario review his personal commitment and contribution to the safety performance of his organization with a view to exercising his authority and leadership in the manner outlined.

that where the Mining Health and Safety Branch identifies an operation as substandard, the district engineer meet with the manager of the operation to review performance and to advise of the branch's response, and further, that the branch so notify the chief executive officer by registered letter.

that where the Mining Health and Safety branch identifies a company as having substandard performance, the director of the Mining Health and Safety Branch meet with the chief executive officer of the company to review performance and to advise of the branch's response.

that the Mining Health and Safety Branch review the cost indicator models being developed by the United States Bureau of Mines for metal mines and assess their applicability to Ontario mining operations. Using these cost indicator models, or some modification thereof, the costs of accidents to each mining company (by operation) be computed on an annual basis.

that a company operating a mine or mining plant in Ontario include in its annual report a comprehensive statement of safety performance including relevant comparative data and a statement of costs incurred.

that a workmen's compensation merit rating scheme, tailored specifically to the mining industry, be introduced.

that the Mines Accident Prevention Association of Ontario carry out independent safety audits and that each mining com-

pany operating in Ontario consent to having the MAPAO perform an annual safety audit.

that the individual companies be ranked on the basis of the audit results and that the ranking be made public by the MAPAO.

First Line Supervisor

that a committee be struck, with representatives of the mining companies, the unions representing workers in mines and mining plants and the government, for the purpose of developing a modular training program for first line supervisors in both underground and surface operations and that individuals be certified by the company conducting the program as competent to supervise in a mine or mining plant upon successful completion.

that from the date the program commences, only persons who have such certification be appointed to fill regular first line supervisory positions.

that persons occupying first line supervisory positions as of the date the program commences, be required to complete the program and become certified within a reasonable time period stipulated by the tripartite committee.

that the number of first line underground supervisors employed by each mining company be sufficient to allow for at least two workplace contacts with each crew per shift and that the time allotted for these visits be sufficient to allow for adequate assistance and instruction to inexperienced crews and crews working in difficult areas.

that wherever practical, a minimum of two group leaders for each first line underground supervisor be appointed.

that individual work crews be more involved in the planning of their work and, in conjunction with group leaders, be made responsible for achieving short-term production targets.

that first line supervisors assume an enlarged role as facilitators, resource persons, planners and safety auditors.

that the ministry adopt an even-handed and consistent practice with respect to prosecutions and make known to the industry that it will not seek to prosecute a first line supervisor or any other employee unless satisfied that he or she has failed to take every precaution reasonable in the circumstances or has otherwise clearly acted negligently in complying with the Act and regulations.

The Worker

that each worker review his commitment to safe work practices and undertake to work in a safe manner at all times and to assume the full range of his responsibilities as a member of the direct internal responsibility system.

Joint Health and Safety Committee

that provision be made in law for a full-time worker safety representative in each mine or mining plant employing more than 500 workers, and that where the number of workers in any mine or mining plant is less than 500, provision be made for the appointment of a worker safety representative to spend a proportionate amount of work time engaged in safety related activities.

that a worker safety representative hold office for a two-year term and work closely with the company's safety department.

that a worker safety representative be a member of the joint health and safety committee otherwise qualified to serve in this position, and

that a worker safety representative not be permitted to hold any union office or to engage in partisan union political activity of any kind.

that a worker safety representative be paid the full amount he would have been paid had he continued in his classification.

that a worker safety representative report all workplace anomalies to first line supervision and to the safety department and that only in the event that the condition is not corrected to the satisfaction of the worker safety representative within a reasonable period of time should the matter be taken up with the joint health and safety committee.

that the existing provisions of the Act which allows the minister to grant exemptions also apply to the election or appointment of worker safety representatives.

that membership on joint health and safety committees be restricted to workers not holding other union positions and to line supervisors or managers, and that workers acting as committee members not be permitted to engage in partisan union political activities.

that joint training for members of joint health and safety committees be undertaken and, where possible, supervisors also be involved.

that, in the absence of agreement to the contrary, the costs of such programs be charged back to the company or union on a per participant basis.

that the chief executive officer and management of each mining company ensure that the joint health and safety committee is consulted on the full range of safety issues and that the documentation, data, materials and other information necessary for this purpose be made available to it.

that the allocation of government monies to health and safety training be on condition that joint training be carried out wherever possible.

that the joint health and safety committee monitor the use of discipline as a tool in the achievement of safety objectives and make appropriate recommendations.

that at least one of the worker members of the joint health and safety committee (preferably the full-time worker representative) be given sufficient time to prepare the worker portion of the committee agendas and to investigate and inquire into the matters which are before the committee.

that the worker members of the joint health and safety committee be provided with a private office (which may also double as the worker safety representative's office) equipped with adequate furniture and supplies and that typing and reproduction services be made available by the company.

Safety Department

that in addition to assisting the line organization, the safety department within each company be made responsible for auditing the safety performance of the line organization.

that the manager of the safety department have direct reporting access to senior executives responsible for the line organization including the chief executive officer.

that first line supervisors receive the requisite training and carry out workplace safety inspections as part of a planned program of rotation of first line supervisors through the safety department.

Unions

that each local union representing workers in Ontario mines and mining plants review its approach to health and safety matters and take the steps necessary to commit itself to a course of union-management co-operation in health and safety administration.

that each parent labour body actively encourage and support union-management co-operation in health and safety matters at the local level and co-operate with the industry in those health and safety endeavours which require the direct involvement of the parent body.

Mines Accident Prevention Association of Ontario

that the Mines Accident Prevention Association of Ontario sever its ties with the Ontario Mining Association, retain the services of a full-time executive director, establish its own offices separate and apart from the Ontario Mining Association offices, make provision for its own support staff and services, and continue to be financed by levies against its member companies.

that the Mines Accident Prevention Association of Ontario establish labour-management advisory committees at both the provincial and regional levels and that it move to include representatives of labour and the public on its board of directors.

Mining Health and Safety Branch

that the Mining Health and Safety Branch advise the industry and its workers in writing of its policies and practices with respect to the enforcement of the Act and regulations and apprise the industry and its workers of any changes to its policies and practices or the adoption of any new enforcement initiatives.

that the branch inspector meet with a worker representative and employer representative before commencing a workplace inspection and that these representatives be required to identify, in the manner described, all unresolved health and safety concerns.

that the branch inspector meet with these worker and employer representatives after the workplace inspection to review their previously identified concerns in light of the results of the inspection.

that the branch inspector review, in the presence of the worker and employer representatives, the minutes of the health and safety committee meetings which have occurred since the previous inspection.

that following each inspection, the branch inspector be required to file with his supervisor a written report on the performance of the responsibility systems at the particular operation.

that branch inspectors be given the training necessary to carry out these responsibilities.

that the Mining Health and Safety Branch develop the capability of responding to relationship difficulties that are impeding health and safety performance.

that the future recruitment of branch inspectors be based in part upon interpersonal skills and that, in addition to their present duties, inspectors be assigned on-site monitoring of the direct and contributive responsibility systems at the workplace.

that, wherever possible, branch engineers be relieved of workplace inspection and be assigned the responsibility for investigation, pre-development review, consultation, educational activity and response to responsibility system breakdowns.

that the future recruitment of branch engineers be based in part upon interpersonal skills and the potential to act in a mediative mode, and that the training and development of branch engineers include these aspects.

that the tripartite committee responsible for reviewing the mining regulations study all recommendations made by coroners' juries investigating mining fatalities for possible general application and make appropriate recommendations.

Ground Control

that wherever practical, fall-on protection be installed on all man-operated underground equipment.

that each mining company operating in Ontario employ at least one professional engineer with post-graduate qualification in rock mechanics and that a person holding such qualification be used in the design and planning of a mine or mine expansion and that a person holding such qualification be made responsible for the company's ground control program.

that a committee of the Mines Accident Prevention Association of Ontario be struck to design a course of study in ground control to be offered through appropriate community colleges of applied arts and technology.

that a planned and systematic program of visual inspection of each active work area be conducted in each mine.

that the inspections be carried out by persons who have specialized knowledge in rock mechanics.

that these inspections be carried out under an auxiliary source of high intensity lighting.

that the persons making these inspections be required to file regular written reports with the supervisor of the inspection program.

that work crews be formally and systematically made aware of ground conditions in the areas in which they are working.

Lighting

that inadequate lighting be investigated as a possible cause of all reportable underground accidents and that in all cases of serious underground accidents, photometric values be recorded by persons trained in the use of photometric equipment.

that the Mines Accident Prevention Association of Ontario, in conjunction with the industry, undertake a comprehensive research program to satisfy the needs which have been identified.

that an independent authority in the field of mine lighting be retained to direct and co-ordinate the research effort.

Worker Training

That, upon implementation of the modular training program in specialized skills for underground miners, a modular training program for surface operations be developed.

that the Mines Accident Prevention Association of Ontario investigate and develop appropriate screening tests for prospective underground miners and make these available to the industry.

that the common core modular training program be augmented by a formal program of on-the-job training leading to full production capability.

That each mining company undertake a comprehensive audit of the skills of its underground miners with a view to using modular training to upgrade skills.

Alcohol and Drugs

that the Mines Accident Prevention Association of Ontario obtain the concurrence of the managements of three major mining operations and commission a study to determine the extent of the relationship between alcohol and drug use and accidents at each of these operations.

that the results of this study be compared with the results of a survey of the accident report forms submitted to the Workmen's Compensation Board by each of these operations; and that, if the results differ significantly, appropriate changes be made in the manner in which alcohol and drug use is identified and reported as a cause of accidents.

that the study include an analysis of the organizational arrangements and the systems of control and communication at each of these operations with a view to determining if these factors contribute to the degree of alcohol or drug use by workers within each operation.

that Ontario mining companies and the unions representing workers in the mining industry seriously consider adoption of an approach to the management of alcohol and drug abuse in the workplace along the lines suggested.

Contractors

that whenever a contractor is engaged, the company meet with the contractor before commencement of the project to stipulate the safety requirements which must be met if the contractor is to be permitted to commence or continue the project.

that the project be rigorously inspected by the company to ensure compliance with these requirements.

that a mining company give preference in the awarding of contracts to contractors who have demonstrated satisfactory safety performance; and that the company consider a reward-penalty contract provision related to safety performance on the project.

that the Mining Health and Safety Branch be advised by each mining company of all contract projects well in advance of the starting date of such projects.

that the Mining Health and Safety Branch increase its regular inspections of these projects and, using its accident profile data, devote special attention to those contractors who demonstrate unsatisfactory safety performance.

that a system of merit rating for purposes of determining the amount of the Workmen's Compensation assessment for contractors operating in the mining industry be established; and that separate rate groups be established for shaft sinking and mining contractors, general contractors and diamond drilling contractors.

that the chief executive officer of each contractor engaged in projects for Ontario mines and mining plants review his personal commitment and contribution to the safety performance of his organization with a view to exercising his authority and leadership in the appropriate manner.

Accident Data Base

that the Ministry of Labour, in consultation with management, labour and the Mines Accident & Prevention Association of Ontario, determine the specific information required to maintain an occupational accident data base for mines and mining plants which satisfies the prerequisites identified, and provide the Occupational Health and Safety Division of the Ministry with the resources and expertise necessary to collect this information, analyse and disseminate it.

Jurisdictional and Administrative Arrangements for The Safety of Ontario Uranium Miners

that the Government of Canada incorporate by reference the Ontario Act and regulations, as amended from time to time, directly into the *Canada Labour Code* as a proviso covering uranium miners and plant workers, and also provide in the code that where the other provisions of the code and this provision are in conflict, the latter shall apply.

that the Government of Canada proceed by way of a reference to the Supreme Court of Canada by the Governor General in Council under section 55 of the *Supreme Court Act*, R.S.C. 1979 C. S-19 and determine whether the federal jurisdiction is exclusive or concurrent.

that the Governments of Canada and Ontario continue the arrangement under which the enforcement of statutory health and safety requirements in Ontario uranium mines is assigned to provincial authorities.

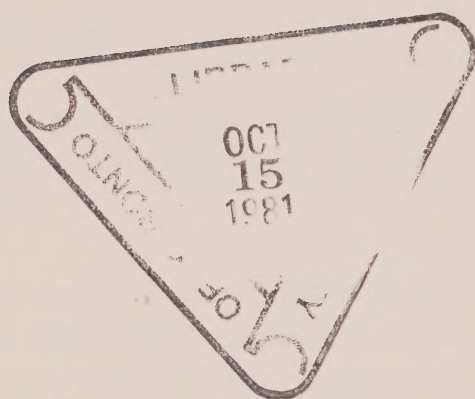
Production Bonus

that individual mining companies and their respective unions agree to discontinue individual (or small crew) production incentive plans.

that the government make known its intention to legislate an end to direct individual (or small crew) production incentive plans in Ontario mines if these plans are not voluntarily discontinued.

Conclusion

that a follow-up inquiry into the adequacy of safety practices and arrangements in Ontario mines and mining plants be undertaken commencing within three years of the release of this report.





The Report of The Joint Federal-Provincial
Inquiry Commission into Safety in Mines
and Mining Plants in Ontario